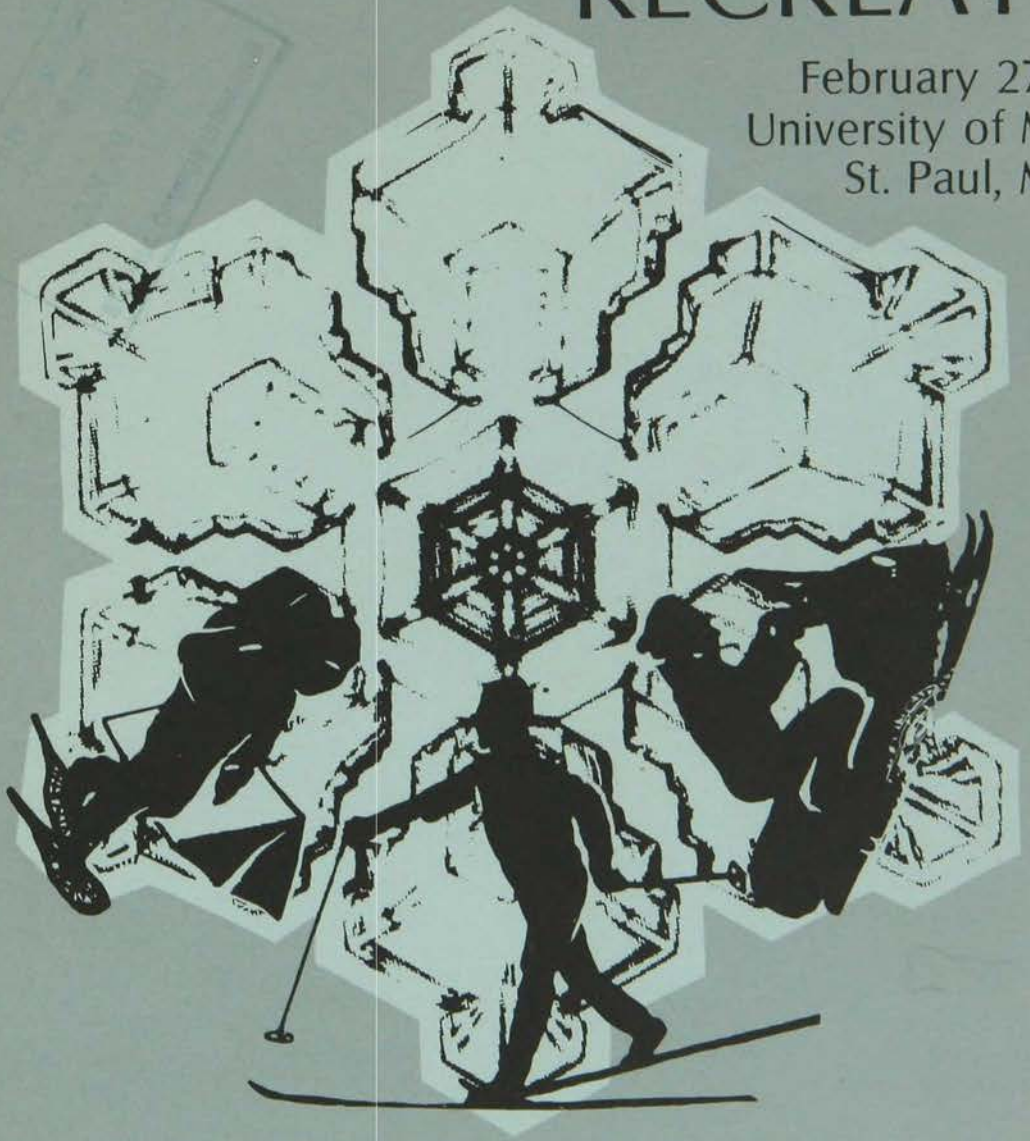
North American Symposium on DISPERSED WINTER RECREATION

February 27-29, 1980
University of Minnesota,
St. Paul, Minnesota



PROCEEDINGS

Office of Special Programs — Educational Series 2-3
Agricultural Extension Service, University of Minnesota

P R O C E E D I N G S

NORTH AMERICAN SYMPOSIUM ON

DISPERSED WINTER RECREATION

University of Minnesota

St. Paul, Minnesota

February 27-29, 1980

Sponsored by:

University of Minnesota
College of Forestry
Council for Recreation, Tourism and Hospitality Research
Office of Special Programs

In Cooperation with:

Hennepin County Park Reserve District
Metropolitan Council of the Twin Cities
Minnesota Department of Natural Resources
North Central Forest Experiment Station
US Forest Service

Published by:
Office of Special Programs
University of Minnesota
St. Paul, Minnesota 55108

1980

Office of Special Programs, Education Series 2-3

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Summary of the

NORTH AMERICAN SYMPOSIUM ON DISPERSED WINTER RECREATION

T.B. Knopp and L.C. Merriam, Conference Co-chairmen
College of Forestry
University of Minnesota

Winter, in lands of cold and snow, has opened new frontiers for those in pursuit of solitude, space and a natural setting. Snowmobiling, ski touring, snowshoeing and winter camping provide the means of access. These activities fit a special category in that they are not confined to elaborate, centralized facilities. This characteristic has resulted in an unprecendented demand on our land resource, both public and private.

Though snowmobiling is a comparatively new recreation activity, dating from the early 1960s, cross-country skiing or ski touring goes back to medieval times in Scandinavia and to the post-World War I period in Minnesota and other snow belt areas. There were active ski clubs with organized competitive events back in the 1930's. Snowshoeing as a popular individual activity also goes back many years and winter camping has developed more recently with the advent of new equipment. In the last decade, these activities, particularly snowmobiling and cross-country skiing, have grown to unforeseen heights. In 1979, Time magazine reported on cross-country skiing as the country's fastest growing winter sport.

This extremely rapid growth in the popularity of snowmobiling and ski touring caught land managers, planners, decision makers and researchers by surprise. At the same time, this expansion offers a unique opportunity to examine the complete "life history" of a form of recreation. After 10 to 15 years from the advent of these sports it seemed appropriate to bring together the accumulated knowledge, experience and creative thinking of those who had studied the participants and those who had coped with the demand at a managerial level.

In late 1978, a group of people representing the Minnesota Department of Natural Resources, the Hennepin County Park Reserve District, Metropolitan Council of the Twin Cities, North Central Forest Experiment Station (U.S. Forest Service) and the University of Minnesota met at the College of Forestry to plan and organize a symposium on dispersed winter recreation as a basis of interchange of practical knowledge,management, planning and research ideas for concerned public and professional persons. There could be no more appropriate location. Minnesota is in the heart of the snow belt states. Snowmobiling has become most important here--in part because of the climate and terrain, but also because it is the home of an important manufacturing industry. Ski touring also grew more rapidly in Minnesota than in any other state. The North Star Ski Touring Club, founded in 1967, promoted the activity and remains the largest club organization in the country.

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In February of 1980, approximately 170 individuals from 22 states and 4 Canadian provinces gathered on the St. Paul Campus of the University of Minnesota. The symposium began with a field session on Wednesday afternoon. Buses provided transportation to Columbia Golf Course, a municipal facility administered by the City of Minneapolis. The group then proceeded to the Elm Creek Park Reserve, a unit of the Hennepin County Park Reserve System. Participants were exposed to demonstrations of snowmobiling, ski touring, winter camping and area maintenance. A supper at the trail head allowed participants to relax and get acquainted.

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On Thursday morning the formal sessions were opened and Dean Richard Skok of the College of Forestry welcomed the group to the University. Featured speaker at the opening session was Mr. Tony Wise, owner and operator of Telemark Lodge in northwestern Wisconsin, considered a pioneer in the development of cross-country skiing facilities.

After obtaining a MBA degree from Harvard and experience as a combat soldier in Europe, Tony returned to his native town of Hayward and proceeded to build what has become an institution. Wise's innovations include the midwest's first downhill ski area with overnight accommodations and groomed slopes. As the enterprise turned to cross-country, he developed 93 kilometers of well groomed tracks, promoted international competi-

tion, established an academy for aspiring young competitors and created a world class citizen's race, The American Birkebeiner. This year (1980) the race attracted nearly 5,000 skiers from 37 states and 13 nations.

In his talk, Tony Wise showed an enthusiasm for cross-country skiing far beyond its appeal as a business venture. He documented the growth of the sport, in particular at Telemark, which he attributed to a growing concern for physical fitness and the enjoyment of the outdoor environment. He then outlined the reasons that the upper midwest is an especially appropriate setting for ski touring, e.g.: rolling terrain, heavy timber, a long snow season, proximity to large populations and low altitude with ample oxygen. He expressed a strong belief that the future of the sport lies in the direction of well designed and maintained trails.

Tony went on to describe his promotional efforts which can be summarized by his statement, "Be the greatest and tell the world!" He believes that the upper midwest will become the cross-country skiing center of America. He said that the energy shortage and the economic situation should not limit the growth of the sport. Ski touring is not only good business, according to Wise, but also a significant benefit to the nation's health. Mr. Wise's talk stimulated discussion throughout the entire symposium.

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The remainder of the morning was taken up by two concurrent sessions consisting of six papers describing the participants in dispersed winter recreation, who they are, what they are doing and what they want. The presenters reported on studies conducted in the major snow regions of the United States and Canada.

A feature of the symposium was the poster sessions held in areas adjoining the conference rooms. Here speakers posted material on their topics with handouts and related material (including slide shows, etc). Participants were encouraged to contact the speakers at the poster session to obtain further information on their topics.

The afternoon opened with a general session featuring a five person panel titled "User Needs and Agency Response." Members were asked to address one of two questions: "What to you feel are responsibilities of (Minnesota Department of Natural Resources, National Park Service, United States Forest Service) to winter recreationists?" or "What do (snowmobilers, ski tourers) expect of the land management agencies?" The panel members were: Donald M. Carlson, assistant to the Commissioner, Minnesota Department of Natural Resources; Boyd Evison, assistant director, U.S. National Park Service, Washington D.C.; William J. Holman, recreation staff, U.S. Forest Service, Washington D.C. Responding for user groups were: Edward Sorgatz, formerly with the Hennepin County Park Reserve District and a spokesman for ski tourers; and Douglas Franzen, an attorney who represents the concerns of snowmobilers in Minnesota. A written statement from each of the panel members is included in these proceedings.

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Four concurrent sessions during the afternoon covered subjects such as planning, communications, conflict, site specific management and trail design. After the sessions had concluded participants were bused to the Holiday Inn for a social hour and banquet.

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Featured speaker at the banquet was Calvin Rutstrum, 84 year old author of "Paradise Below Zero" and numerous other books on wilderness, log cabin building and outdoor skills. Drawing from many years of experience and a unique perspective, Mr. Rutstrum gave an entertaining, yet practical demonstration of cold weather gear. He also presented slides of a winter dog sled trek across the Canadian arctic. It was a fitting climax to a full day.

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The formal sessions continued Friday morning and dealt with the commercial role and trends in participation. After a coffee break, participants divided themselves into three groups. The first was a repeat presentation of the audio visual presentation by forest officers of the Sawtooth National Recreation Area in Idaho on the provision of multiple experience level opportunities for Nordic Skiers; the second was a showing of the snowmobile film "Winter Ride." The third group met for discussion of key questions in the symposium presentations:

1. What is the responsibility of the various levels of government toward winter recreation?
2. Are public agencies or the private sector taking the lead in establishing an image of winter recreation and providing opportunities?
3. How does spatial variety affect user satisfaction?
4. Precisely, what kind of data do managers and planners need to make allocation and design decisions?

There was intense discussion on the first two

topics in the remaining time. There is some evidence of overlap between public and private offerings where there could be more complementarity.

Obviously, this symposium did not answer all of the questions on dispersed winter recreation. It did, we believe, bring together a number of concerned individuals from throughout the United States and Canada to share ideas and experiences. Thus, it should provide a feel for the "state of the art" and a benchmark for future investigations, planning and management operations. Further, it offers a starting point for future conferences and decisions on the growing field of winter recreation.

PANEL: User Needs and Agency Response

Ed Sorgatz
Sunset Lane
Maple Plain, MN 55357

In a letter which I received from Tim Knopp in January, Tim explained that based on my previous experience as a park manager and now as a private sector X-C participant, I would be well-qualified to address the subject of "What do ski tourers expect of the land management agencies."

Upon reading Tim's letter, I breathed a sigh of relief, for this is a subject I still know, or rather remember, well.

Following are the eight things which ski tourers most expect of land management agencies:

1. Regardless of how early in the year the first snowfall occurs, you will be open for skiing on the following day.
2. Regardless of the weather conditions, number of skiers, or any other variable you will have a track prepared suitable for Olympic competition.
3. Regardless from which direction the wind blows, you will have situated the trail so there is a windbreak protecting the skier.
4. Regardless of where a skier gets tired, you will have had the foresight to place a shelter there. (The same level of expectancy exists relative to children to go potty and the placement of restrooms.)
5. Regardless of the number of skis already rented out, you will have in inventory the correct size boots, poles and skis for a family of six as well as a spare pair of wool sox, size 5, for Junior who forgot his at home.
6. Regardless of your caution about starting out on the long trail after 3:30, you will be understanding when the ski patrol has to go out and make a rescue because there was still 4 miles to go when it got dark.
7. Regardless of the fact that your park consists of only 23 acres, your trail system will offer the following trail options: just learning, easy, more difficult, most difficult, unbelievably difficult and racers only; each available in options of 2.5, 5, 10 and 15 kilometers--and finally,
8. They expect that next year you will have available one more trail system offering all of the above.

Seriously, the ski tourers I have dealt with are really not that demanding; however, I think that the comments serve to point out that, in fact, to some degree, each individual skier expects the land management agency to provide facilities which satisfy his own personal needs.

The growth of the sport over the past 10 years has provided to the public a complement of facilities which does a reasonably good job of satisfying the bulk of the needs for a majority of skiers. In the next ten years, which we might consider a maturing phase, should we be addressing ourselves to some of the non-basic needs of the sport?

A great deal has been said in this symposium relative to the identity of the cross-country skier; who he is, what he wants, what his preferences are, etc. One could at this point draw a pretty sound conclusion as to what makes up the "average" ski tourer. However, is there a danger in using these X-C skier profiles as a basis upon which to build future trail systems? Will the conclusion be drawn that by providing what the "average" skier wants, the needs of X-C skiing will be fulfilled?

In fact, there is no "average" ski tourer. There is simply a larger number of skiers who prefer particular skiing opportunities relative to the balance who prefer or need something different. In other words, I feel there is a danger in constructing trail systems which may meet the needs of the so called "average" skier but which do little to continue to make X-C skiing an expanding, interesting and vital entity in the winter recreation field.

The real challenge to the decision makers in our public agencies is to create trails and systems of trails which meet the needs, nut just of the average skier, but rather which meet the needs, present and future, of all the skiers.

If you think we are presently handling all the needs of our skiers, ask yourself this: Where can the high school racer or accomplished amateur racer train for his sport free of the inevitable conflict with the recreational skier; Where can the visually impaired skier come on a regular basis and find his needs fulfilled; At how many locations can a skier participate in his sport at night because his schedule does not permit daytime skiing; How many forms of public transportation are presently available to take you and your skis to your favorite trail; How many trails that you ski do a good job of providing a variety of skiing opportunities geared to the skill level of all the members of your family; At how many areas, close to home, can you plan a ski-in camping trip.

These are just some of the areas we need to deal with in developing future trail systems for all our skiers. Developing the answers to these questions will require a number of things to happen.

First, is the recognition, by all our public agencies, of the status of cross-country skking as a winter activity. Cross-country skiing is no longer running a distant second to snowmobiling. It is now the fastest growing winter sport in North America, and as such should receive an equivalent degree of attention, financially and otherwise.

Second, and perhaps most difficult to achieve, is the establishment of a coordinated effort amongst all the public agencies involved. No one agency can do it all. It will require a common coordinated effort from everyone--city, county, state and federal governments as well as the private sector.

Third is support from the skiers themselves. Developing and operating facilities for the sport we enjoy will not be free. We must indicate a willingness to pay for what we want, both through taxes and user fees. A simple letter or phone call to the people who matter (our public agency directors and legislators) will help immensely in getting the word across--"we have a need and we are willing to pay to have that need fulfilled."

The sport of cross-country skiing has come a long way in the past ten years. It still has a long way to go. Hopefully, through appropriate recognition of the sport, proper coordination of effort, and substantial support from the X-C skiers themselves, we will see the second decade of growth surpass even the past decade, by providing a complement of opportunities which will properly deal with the needs of all our skiers.

PANEL: User Needs and Agency Response

William J. Holman
Recreation Staff
Forest Service, USDA
Washington, D.C.

Thank you for the opportunity to participate in the North American Symposium on Dispersed Winter Recreation. The Forest Service has three operating arms. They are State and Private Forestry, Research, and National Forest Administration. There are about 187 million acres of land within the National Forest System. Each year the National Forests receive over 1/2 of all the recreation days spent on Federal land. Most of this takes place outside of recreational sites that serve to concentrate use, such as ski areas for Alpine skiing.

One of the goals of the Forest Service is to increase the supply of outdoor recreation opportunities and services through programs which emphasize dispersed types of recreation opportunities. Some of those programs are aimed at activities that tkae place in winter on snow. Let us look at a few statistics that may indicate demand or at least interest in outdoor snow oriented recreational activities on the National Forests.

5-Year Period MRV'DS

	1974	1979	Increase
Snow play	1,344.1m	1,644.2	1.2 Times
Cross-country skiing	349.3m	984.1m	2.3 Times
Snowmobiling	2,949.1m	3,294.9m	1.1 Times

Snow play is any dispersed recreational activity that depends on snow, other than snowmobiling and cross-country skiing or snowshoeing. Examples include tubing, sledding and several other activities that take place on snow. Problems include providing safe off-highway parking, public safety, and information on where to go. The Forest Service has develoepd some sites specifically for this type of activity; however, most use takes place anywhere there is snow.

Most of the other snow related recreation activity depends on trails or at least routes through the National Forests. First, let me tell you about the philosophy of trails within the National Forests. Most of the trails on the National Forests were built as part of the Administrative transportation network. These trails were designed to move men, equipment, and pack animals effectively from one place to another for fire control and other administrative purposes. Many of our trails have been replaced or are parallel by roads. Others are not maintained because people were not using them. As a conservative estimate, we once had over 150,000 miles of trail. We are now making indepth field assessment of trails to determine the condition of the system and what trails are needed to meet land management objectives. We have about 98,000 miles of trails of which one-third of the mileage is inadequate because it does not service recreation purposes or is contributing to resource degradation. About 11.3mm visitor days are spent enjoying National Forest trails. However, we are turning this situation around. The National Forest development trail system is now managed to provide a range of trail-related recreation opportunities commensurate with land capacity and the public need. The system includes opportunities for risk and challenge as well as opportunities for the handicapped. It provides the American people with a network of trails so they may experience the widest possible variety of environments, season of the year, and modes of travel.

This system reflects a philosophy of perpetuating a wide spectrum of recreation objectives invisioned for the trail user. Ultimately, the system will include approximately 120,000 miles of trail designed and managed so that the trails and associated resources are not subject to degradation through erosion, trampling, and other induced influences. Use will be prescribed for the area through which a trail goes.

In fiscal year 1970, we spent $4,500,000 for trail maintenance and $4,000,000 for trail construction. In fiscal year 1978 we spent $9.3 mm for trail maintenance and $7.6 mm for construction. This past year, $20 mm. This demonstrates the extreme interest we have in trails.

Now, let us talk about snow trails and routes and the problems or rather the opportunities we have within the National Forests. First of all, we have approximately 17,000 miles of groomed or at least signed snowmobile trails.

In addition, there are many thousand miles of unplowed roads that are available to people who want to snowmobile. We also have about 6,000 miles or 10,200 kilometers of groomed or at least signed trails for cross-country skiing, In addition, there are many thousand of acres of land open to the cross-country skier. But with all of this, we recognize that we have many problems or rather opportunities to improve our management in the following areas.

Ourselves - Forest Offices. Many times if a Forest Officer does not participate in one of these activities, then often little is done to offer the opportunity to the public in that area. This is because there is a lack of knowledge of what to do in order to provide or make snow related recreation opportunities available to the public. Over the last two years, with the help of skiers and snowmobilers, we have been developing a Guide or a Handbook to help our managers get snow trails on the ground. We have also encouraged our managers to work with user groups to develop or maintain snow trails.

A second problem area is lack of coordination between other Federal agencies, State and local agencies. There is a need to coordinate activities such as snowplowing of parking areas, law enforcement, signing, placement of trails and public information about trail opportunities in the federal, state, local and private sector. We have undertaken some activities at the national level that are aimed at improving coordination. One outstanding example is in our working relationship with the weather bureau and avalanche hazard forecasting. For example, in the Pacific Northwest, the weather bureau is announcing the avalanche conditions over NOA weatherradio and we are using their facilities to make forecasts. There are also several examples where State government, volunteers, and the Forest Service have cooperated in activities such as snowplowing for parking areas, trail grooming and law enforcement.

This brings me to the next problem area:

Public Information. There is a lack of "where can I go" information. More often than not it is word of mouth that brings people to an area. We have developed a few brochures. However, for the most part, the general public is on its own to find a place to go that suits his or her purpose. This often results in overuse of the more popular spots and over-crowding. Teaching outdoor skills and awareness is also another area where we must all cooperate in developing public information. This includes information about avalanche conditions, human waste disposal, pack in-pack out, hypothermia, and many other environmentally oriented education programs.

The last problem area is conflict. When there is only so much snow to go around, conflict can be minimized if we all take some positive action to do so. Some actions that can be taken by the managers are:

1. Separation of users away from a parking area by time and space.
2. The user can accomplish some by learning rules of the road and practicing ethics of "Do Unto Others."
3. User groups working together to solve problems.

In summary, the future depends on solving or at least minimizing the problem areas by working together. We have found that the public does not care who owns or manages the land; all they are interested in is the opportunity to enjoy their particular recreational pursuit. It is up to us, the Federal, State and local bureaucrats to work with each other and our visitors to insure that there is always a variety of snow-related recreation opportunities availabe to the American people.

PANEL: User Needs and Agency Response

Donald M. Carlson
Assistant to the Commissioner
Minnesota Department of Natural Resources

Winter trail use forms a major part of the Minnesota's dispersed winter recreation picture. Minnesotans snowmobiled eleven million times in 1978. That is more participation than any other winter recreation activity, excepting ice skating. Cross country skiing found popularity among Minnesotans in 1978 too. The Minnesota Department of Natural Resources estimated that Minnesotans cross country skiied over four million times that year.

These snowmobiling and cross country skiing occasions resulted from the activities of a substantial portion of the population. Nearly one million State residents claim to snowmobile. A half a million cross country ski. With a State population just over four million, these two user groups constitute a significant clientele.

And these two groups wield a fair amount of economic power through equipment purchase alone. We estimate that Minnesotan's own over 400,000 snowmobiles and another 400,000 pairs of cross country skiis. Assuming an average book value of 1,000 dollars per snowmobile and 50 dollars per pair of skiis, not counting clothing and other support equipment, the investment in these sports is nearly half a billion dollars for snowmobiling and 20 million dollars for cross country skiing.

With this high investment, it is not surprising to see that our public pool for winter recreation shows an extremely strong demand for more cross country skiing and snowmobiling trail development. Statewide, the demand for these dispersed winter recreation facilities in in the highest category of desire.

Furthermore, desires for snowmobile and cross country skiing facilities are tow of the three activities in the high desire category.

The third, the traditional pursuit of hunting, further emphasizes the importance of these activities to Minnesotans. With so many people paying so much to ski and snowmobile in Minnesota, it is inevitable that a significant lobby should develop. This lobby forwards the interests of recreators and equipment suppliers alike. Meeting these interests is a major program within the Department of Natural Resources Trails and Waterways Unit. In fact, trail provision, along with access to public waters and boating and canoeing has become such a major activity that the Department of Natural Resources has been reorganized to accommodate the demand.

Previously to October, 1979, trail planning, development and maintenance along with water access and boat and canoeing rivers were programs in the Division of Parks and Recreation. Now, these have been combined and elevated to divisional status within the Trail and Waterways Unit.

The purpose of this Unit is to effectively and efficiently meet the needs of these public interests. I choose the words efficiently and effectively carefully.

Programs in the Minnesota Department of Natural Resources are experiencing severe budget squeezes. These budget squeezes result from inflation, a general negative attitude toward big government and disenchantment with the quality of services provided by government agencies.

Naturally, when it comes time to consider budgets, the least essential public programs get hit first and hardest. Though I am sure most of your would disagree, it seems that recreation opportunity provision is not high on the hierarchy of public services. Therefore, it experiences funding cuts directly or through a failure to keep up with inflation.

When there is less money, there is less equipment and personnel to work with. Carefully considering expenditures of those resources is imperative to effieicnt and effective programs. Furthermore, in a climate of less government, inefficient, ineffective programs will be the first to perish, along with their leaders.

Ignorance of the consumer is a foe of efficient, effective and thus long-lived programs providing for the public. In the case of winter trail provision, this is as true as in the case of automobile sales or fashion retailing. Knowing the pulse of the consumer and following that pulse maximizes consumer satisfaction and profit in the private world. In the public sector, good responses to knowledge about consumers

and their demands maximizes the resources made available to the program. Whether we like the sound of it or not, that is the underlying goal of any program manager.

What kind of consumer knowledge does the winter trail program manager need? What do we know about winter trail users today? And how have we followed that knowledge?

The most basic breakdown of the kinds of consumer knowledge needed yields three classes--typed by where they impact the program. First, giving overall program guidance is Comprehensive Data. It measures the pulse of the public throughout the market and forms the base for the system plan. Because of its general nature, this information must be used carefully. Otherwise over generalization will lead to a failure to recognize and meet the needs of smaller but very significant user groups.

Following the comprehensive design of a program, Project or Site Information guides program managers as they begin the design of the ground facilities. Here the astute program manager remembers the drawbacks of generalized comprehensive data and balances these drawbacks by analyzing the site degisn data to discover market segments.

The third type of information required is Site Management Data. The most important difference between this data and the earlier data is that it primarily deals with personnel interactions with users rather than user interaction with resources and facilities.

Before going any farther, I should confirm what must by now be obvious to some of you--there is overlap between the application of data in these two categories. For example, if comprehensive data forms the sole basis for overall program guidance, the system plan, then that plan would not provide for minority market segments uncovered through analysis of site design data.

In addition, good site degisn eases people management. The converse also holds true. Poor site design excerbates people management problems.

The three basic types of user data--Comprehensive, Site Design and Management form the framework of the program management information system necessary to maximize the productivity of public resources for winter trail use.

In each of these areas, Minnesota has uncovered data about winter use, through the work of the Policy and Research Section of the Department's Office of Planning.

Some of the data has been gathreed using formal mechanisms--like surveys. Some has come from public input, such as meetings and hearings.

Being an agency of State government, some of the information comes from politicians and some comes from the intuition of managers and planners with highly successful track records.

Bear with me for a moment of digression. Managers often fail to recognize this last method, "Intuition," as a legitimate component of a management information system. However, managers generally owe part of their success to an extra ordinary ability to know when to follow the hunch. This ability should be recognized and utilized. Therefore, I list it and utilize it as a source of information.

At the comprehensive level, we have discovered Minnesotans want more trail opportunities, both summer and winter. Our response here is twofold. The first and most predictable response is our continual program of trail development. Between now and July 1, 1982, the Department has 4.8 million dollars to spend on development.

Linear (corridor trails) development, will be accelerated during the next two years.

Special emphasis will be placed upon the Taconite, Hearland, Northshore Trails in Northern Minnesota; the Luce Line going west out of Minneapolis and the Sakatah Singing Hills in South Central Minnesota.

The Department is pursuing purchasing an 18 mile segment of railroad going Northeast from St. Paul. Land exchanges and offers to purchase other abandoned railroads to complete major corridor trails or provide connecting links has been accelerated.

Our second response is spreading the word on existing winter trail opportunities. In this case, we are embarking on a project of producing multi-county trails maps. These are being designed to be inexpensive for wide distribution but detailed for usefulness. Detail is necessary because minor roads are important and landmarks vital when it comes to trail access.

We also depend upon our own snow reporting service, trail conditions reports and feature stories through the Bureau of Information and Education.

The Department of Economic Development features trail opportunities through radio and TV.

Another piece of user information guides our development program. We have found that winter trail users do not care to travel long distances to pursue their recreation.

Snowmobilers on the average will travel 50 miles or so, cross country skiers about 30 miles. In response, the Minnesota Department of Natural Resources is re-addressing its trails development policy by using distance relative to population as a prime factor in locating trails.

Non-motorized recreation, which for the large part is hiking and cross country skiing is increasing yearly. State Parks and State Forests like the facilities of local units of government are the recipients of this increased use in proportion to their closeness to Urban Centers.

To meet this demand, the Department has allocated over one million dollars to either build or up-grade the trails in 32 State Parks and State Forests.

About one half falls within the mileage limitation of major population centers. In addition, under this policy, we have reconsidered the need to develop trails that may have previously been deemed desirable.

Location to population and willingness to travel like other comprehensive user information can lead to poor decisions. For example, the location relative to population data fit in the case for exceptional scenic areas. When exceptional scenic areas are available, the population-travel distance data may have to be given less weight.

Finally, an example of comprehensive information gained through the "Intuition" method. When we commenced our trail program in earnest in the late 1960's, it was evident that trail development would affect large numbers of people in the path of development. In fact, because trails, unlike parks, crossed the countryside--they impact the adjacent landowners.

Intuition told us that the Department could be hard pressed to get trails built and accepted with such heavy resistance eminent.

One solution found by our seasoned managers and adopted by the Legislature was to enlist the aid of the local units of government and trail groups in a Grants-In-Aid program. The program is based upon short term easements rather than fee simple acquisitions. This created a strong incentive for users to police themselves. Otherwise they risk termination of the easement by the land owners. The result of this "Intuitive" decision is a Grants-In-Aid system providing the majority of our trails near user groups and in the land across the landscape they desire to traverse. Today, there is nearly 65,000 miles of Grants-In-Aid trails.

Site design data based on user input has affected the Department's action in a variety of ways. Our data base indicates that snowmobilers desire trails that connect units of the State's Outdoor Recreation System. This data supports the need for State linear trails and helps define their routes.

Our research also shows that both skiers and snowmobilers desire network trails rather than just linear trails. This knowledge is being implemented by the Department through readjustment from planned corridor trails in the unpopulated areas and towards trail networks on public lands and connecting links near population centers.

The excellent reception given the trails in the St. Croix - Wild River State Parks is an example of the benefits we derive from a program based on this type of site design data.

Our management information system shows us that cross country skiers and snowmobilers need separate trails. This has resulted in the implementation of a zoning policy in our State parks. Ski Trails are placed in one section while snowmobilers have been restricted to another. On some point to point linear trails where the demands exist, separate treadways will be established within the right-of-way.

Finally, our site design data show that among other resource preferences, winter trail users prefer trails located adjacent to water courses. As a result, we intend to go to greater lengths to route trails in areas offering exposure to water scenery.

Site management is the most elusive information of all. It encompasses psychological and sociological dynamics as well as physical resource design.

Sadly but predictably, this is the weakest link in our management information system. Given the fact that operation and maintenance dolalrs are hard to capture while acquisition and development dollars come more easily--little has been done in this area.

We are beginning to build in this area while we are trying to convince the legislature to appropriate more funds for operations and maintenance.

We are committing more of our trail manager's time to user monitoring. By structuring

the user monitoring to include observation of such things as likes and dislikes of the users and reasons for using trails, we will begin to better understand why people use the trails and how to manage them to meet the expectations.

In addition, we are looking to secondary sources of information about user motives. For example: Research on the types of cross country skiers in Minnesota, such as that done by the University of Minnesota, will help direct our managers.

Lastly, we are looking to input from users and even non-users through public meeting to discover how management can best meet user needs and still satisfy the impacted non-user public.

In this area we see that users demand, and rightly so, the opportunity to use existing public facilities in a safe and pleasurable manner.

To provide this experience, the Department has accelerated its enforcement of proper trail conduct by assigning more patrol work to its Conservation Officers and contrasting with County Sheriffs.

Due to funding limitations, County Sheriffs have had limited success, thus the Department has undertaken a pilot program to better finance and monitor the program.

Based upon the Counties' past enforcement program, desire to expand operations and the intensity of trail uses, especially snowmobiling, the Department has set up a pilot enforcement program. Seven counties are involved--including two of them in the seven country Metro Area.

This program will be evaluated during the summer of 1980. Should it prove to provide winter recreators a safer, more enjoyable experience--the Department will request the expanion of this Grants-In-Aid law enforcement program.

Looking in the future, a great deal of our Department's effort in winter recreation will be contingent upon the cost of energy. Not only on how much users are willing to pay to reach even close in sites, but how much energy money we will have to develop and maintain in our trails.

Regardless of the willingness of the user to agree to a license fee or a tax to build, operate and maintain facilities, I am convinced the opportunities readily available will be based strictly upon the energy that will be available.

I am also convinced the present management information system employed by the Minnesota Department of Natural Resources will be able to provide the data upon which we will tailor dispersed winter recreation.

This data gathered through a variety of efforts leads decision makers not only in trails, but the entire recreation and natural resource fields of the Department towards programs that meet user needs.

Our philosophy hinges on the goals of understanding and meeting the user's needs effectively and efficiently in a time of scarce public resources. Our mechanism to meet these needs is based on a thorough program management information system. This system holds comprehensive, site design and site management data.

PANEL: User Needs and Agency Response

Douglas Franzen
O'Connor and Hannan
Minneapolis, Minnesota

Ladies and gentlemen, fellow enthusiasts of winter recreation, I am delighted to be with you this afternoon to offer the perspective of North America's 20,000,000 snowmobile enthusiasts on the key issue of "User Needs and Agency Response."

Let me briefly outline the stature of the snowmobile industry and sport today. Twenty years ago, recreational snowmobiling was a dream in the eyes of a handful of industry pioneers based in Roseau, in Thief River Falls and in a few other snowbelt locations. For most of the 1960's, snowmobiling remained a novelty. As the machine grew in sophistication and dependability during that decade, it began to attract more attention. For Americans and Canadians who had long been the prisoners of winter, for those who sought to overcome the mobility restrictions imposed by ice, snow and bitter cold, the snowmobile was an invention of great significance.

The consequence was an explosion of participation in snowmobiling at a rate of growth few, if any, other recreational activities have ever seen. In twenty short year, U.S. participation in recreational snowmobiling expanded from nearly zero to 14.2 million persons during the 1977-1978 winter season, according to Opinion Research Corporation studies for the Heritage Conservation and Recreation Service. The industry serving these 14.2 million Americans and their 6 million counterparts in Canada mushroomed to a level of some $2.6 billion in annual sales today, counting snowmobiler expenditures on equipment, clothing, accessories and directly related goods and services.

Snowmobiling has come to plan an interesting and important role in snowbelt lifestyles and economies. For millions, snowmobiling offers an opportunity for healthy, active family fun. Adults have rediscovered the fun and excitement children naturally exhibit towards winter, but which disappears all too often as we grow older and think of snow only as a disruption to our busy schedules. And for countless snowbelt communities, snowmobiling has brought economic vitality during winter months which were once characterized by economic hibernation.

How have governments--local, provincial, state and federal--reacted to this surge in dispersed outdoor activity? The answer is not a simple one. In some instances the response has been extraordinary; in others we are still waiting to see a response of any kind.

The response snowmobilers seek is safe, secnic trails: trails which begin close to home and offer a variety of destination opportunities, from natural areas to overnight accommodations. We seek safe, plowed parking facilities at trailheads and trail maps showing special points of interest, snowmobile service facilities and places to eat and obtain fuel. We seek winterized restroom facilities and well-signed and well-groomed trails. And, perhaps most of all, we seek access to information on the availability of these features.

North America's organized snowmobilers take great pride in the fact that they have played an active role in meeting their own needs. Millions of snowmobilers across North America's snowbelt belong to local snowmobile clubs. Some 1,500,000 snowmobilers belong to state and provincial associations which constitute the International Snowmobile Council, the structure which links together the North American snowmobile community.

Two prime activities of the organized snowmobile community have been volunteer trail development efforts and cooperation with government officials in creating and operating public snowmobile trail programs. Today, snowmobile clubs administer some 200,000 miles of "private" snowmobile traills--approximately half of which are readily available to the public for its use. Creation and operation of these trails are the result of volunteer labor by snowmobile club members--cutting trails across privately-owned lands with the owner's permission, building bridges with materials bought or salvaged, posting signs and installing gates in fences.

Beyond this, snowmobilers have worked with government officials to create and fund public snowmobile trail programs. Snowmobilers generate astonishingly high revenues at the provincial, state and federal levels through registration fees, fuel taxes and sales taxes on their

equipment purchases--some $90 million each year. Many states, including Minnesota, have provided for a return of a portion of these monies--usually registration fees and state gasoline tax paid on snowmobile fuel--to build and maintain trails. And in most of these jurisdictions, snowmobile trail programs depend heavily upon grant-in-aid programs which combine volunteer snowmobiler efforts with public monies to fund out-of-pocket costs.

As of August, 1978, the North American snowbelt boasted over 90,000 miles of marked and maintained public snowmobile trails. State and provincial snowmobile trail program budgets for the 1978-1979 season totaled more than $1,000,000. Of the 40,000 mile total in the United States, the largest single portion of trails--43.5%--was on private lands, mostly farm lands. The next largest share of snowmobile trails in the U.S.--21%--was on federal lands, the large majority of which were lands managed by the Forest Service. The remaining trails were on state-owned lands (19%) and on lands owned by local units of government (11.5%).

Lands managed by government agencies are of special importance to the snowmobile community for several reasons. First, they are often especially scenic and offer large, undeveloped tracts for the natural experiences snowmobilers seek. Second, public lands constitute large tracts under single management entities. Thus, planning and developing a trail can be much easier than developing a trail of identical length across the patchwork quilt pattern of other lands, where permission is required from hundreds of individual landowners.

Third, public lands offer hope of some permanence. Those who work with trails on private lands know only too well the frequency of trail changes resulting from private property sales, new development and uses of the land and even landowner attitude changes.

Unfortunately, the pattern of land ownership is most complex--and thus trail development is more difficult--where population density is higher. Population density in this case includes those who live there year-round and those who come to play, as well.

This means that the eastern half of the United States poses a special challenge to linear trail system developments at the state or regional levels for any use, whether snowmobiling, nordic skiing or bicycling. The concentration of people is high and public lands--federal and state--are both limited and subject to many competing demands. For the snowmobile community, those states east of the Dakotas include 78% of the nation's snowmobilers. Yet the eastern region holds only 6.1% of our nation's national forest system, for example.

The consequence is that in the east, even more than elsewhere in our nation, government agencies at the federal, state and local levels and organized snowmobilers must work together closely to overcome very real obstacles.

The snowmobile community has developed a deep respect for those conscientious and talented officials in federal, state, provincial and local governments. Government officials and snowmobilers have formed partnerships again and again which have proved capable of responding to the tremendous new needs for winter trails of the past decade.

Yet major challenges remain. Too many recreational programs across the snowbelt remain focused on warm weather activities only. Too many parks at all levels close their gates, figuratively as well as literally, with the coming of snow. Too few park managers have taken advantage of the opportunities for transport provided by the snowmobile over snow-covered roads used by wheeled vehicles in summer. Part of this is a reflection of inadequacies in the budgeting and planning processes of government. Budgeting is often incremental in nature, and in a number of states and provinces the radical changes in winter recreation participation have not been adequately recognized.

The snowmobile community also recognizes that governmental responses to the new needs of snowmobilers are hampered by widespread constraints on government budgets. Unfortunately, recreation programs are often the first to feel cuts, and new recreational needs face obvious problems when traditional recreation services are being cut back.

The solution is an active alliance among winter recreationists, and particularly between snowmobilers and nordic skiers. This alliance is evolving rapidly.

Proof came in May, 1979, when a representative of the nordic ski community appeared at the International Snowmobile Congress and spoke of shared concerns and common goals. Further evidence came on July 17, 1979, at the National Nordic Conference, attended by the nine principal organizations involved in nordic skiing. The following resolution was adopted at the session:

> "Recognizing that nordic skiing and snowmobiling have numerous common interests, and further recognizing that these interests have, on occasion, led to conflicts, the delegates of the National Nordic Conference recommend

that a firm alliance-of-communication be developed between the nordic and snowmobile communities and the following issues be addressed:

*That land use planning should be cooperatively approached with mutual concerns for environmental protection and seeking the best solutions for the good of these recreations;

*That mutual educational efforts should be embraced in areas of signage, trail etiquette, liability, safety, rescue and technical communication;

*That individuals have a right to enjoy their choice of recreation."

Cooperation in the Okanogan National Forest in Washington was highlighted in the December, 1979 issue of Signpost magazine. Competition had developed in Washington's scenic Methow Valley among growing numbers of winter recreation enthusiasts. A meeting was arranged by local Forest Service personnel to discuss the issue. At the meeting, by common agreement, a proposal for a formal regulation governing use of the area was discarded once good communications were established. The local snowmobile club volunteered to exert its considerable influence to keep snowmobilers off trails near a ski-touring center. And the results? The article's author, an avid nordic skier, writes:

"The happy conclusion to this story is that the compromise worked. We haven't seen a snowmobile up at Sun Mountain except for our track setter. And a bonus. The snowmobilers turned out to be a good group to work with.

They agreed to help with search and rescue. They are willing to ferry skiers to backcountry trailheads. They helped prepare the cross-country race course up at Mazama last year and plan to do the same this year.

We are pooling knowledge with them. At a snowmobile club meeting last winter, we gave a presentation on avalanche safety. Again this year we plan to hold joint meetings."

Similar progress is underway in Ontario. On January 9, 1980, the Toronto Globe and Mail proclaimed: "Skiers, Snowmobilers End Feud Over Trails." Said the article:

"The animosity, caused by the two sports sharing trails and space, is being replaced by a spirit of co-operation and optimism among the organized skiers and snowmobilers.

Mel Mendrek, technical co-ordinator for the Ontario Ski Council has nothing but praise for the machine enthusiasts. 'If it were not for the snowmobilers, we would still be skiing the back 40.

We owe them a great deal. We borrowed technology for trail-development and grooming.'"

In Ontario, snowmobilers aid nordic skiers at races by preparing trails, transporting officials and equipment and providing first-aid services. In addition, eastern Ontario boasts at least three joint snowmobiler/skier clubs that plan, develop and maintain winter trails for both sports.

Winter trail user cooperation in the southern Cascade area of Oregon has produced a tangible results--an updated and expanded map-brochure for winter trails. The trail designations, markings and mapping are the produce of cooperative efforts of the U.S. Forest Service, two nordic ski clubs, two snowmobile clubs, the state's highway department and the U.S. Bureau of Land Management.

Earlier this month, leaders of the nordic skiing and snowmobiling communities gathered with a variety of eastern U.S. government officials to discuss winter trails progress and needs. The conference, the first of a series co-sponsored by the U.S. Forest Service, the snowmobile and the nordic ski communities and scheduled to occur across the snowbelt, put advances in skier/snowmobiler relations on a new, high-visibility platform.

For all those who know winter's beauty, for those who know why children greet the first snowflakes of the season with tremendous excitement, an active partnership between the nordic ski and snowmobiling communities is cause for a cheer. The united efforts of these two large and growing groups, combined with the efforts of responsive government officials, can ensure that the plowed parking areas, the marked, mapped and maintained trails, and the warming facilities that all winter lovers want are readily available for all. Together, snowmobilers, nordic skiers and government officials will make it easier than ever for all to abandon sedentary, indoor lifestyles for outdoor fun in the snow with family and friends, enjoying some of nature's most scenic sights.

We ask for, and expect to receive, the continuing assistance of our friends in government in making this possible.

PANEL: User Needs and Agency Response

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What follows will deal less with the who's, where's and how many's than with the why's of the National Park Service's approach to dealing with dispersed winter recreation. To some of you, what I'll say may seem almost insultingly simple and obvious--but bear with me, please, because what seems elementary is in fact fundamental; and unless you understand why we exist, as a Service, you may fall into some "perception traps" that still show up even among National Park Service employees. Those perception traps can lead to unwise decisions about the kinds and amounts of use that we provide for, in the National Park System.

First, what is the National Park System? It's more than 300 areas, each special and distinctive in its own way, ranging in size and purpose from small, historically significant buildings in intensely urban settings, to complex mixtures of natural, cultural, and mass-recretional resources in major metropolitan regions, to a multi-million acre wilderness many hundreds of miles away from any major urban population center. Each area is managed in accordance with its enabling legislation; but undergirding it all is the basic mandate given us in our 1916 Organic Act, which is:

> "...to conserve the scenery and the natural and historic objects therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

"Conserve...unimpaired," and "provide for... enjoyment of..." Those two directives are commonly characterized as posing, for us, the "preservation/use dilemma." It is a dilemma, of sorts, because some of that enjoyment must involve direct physical contact with cultural and natural resources, with some resultant impairment--however slight or brief--of those resources. And in the case of the resources of the natural zones of the areas that we administer our principal concern is with ecosystems integrity, or something as close to integrity as we can achieve. That integrity, and the integrity of the historical resources in our care, is the base on which the opportunity for enjoyment--and for the increasingly significant benefits to be derived from the study of relatively undisturbed ecosystems--is built.

Although other agencies of the Federal government have their preservation responsibilities, among land-managing agencies, preservation as the most basic element of its mission is unique to the National Park Service. And that "preservation/use dilemma" does pose some problems for the Service; but some of those problems are the result of the way the public--and we, as managers--define "use." The tendency is to think entirely, or nearly so, in terms of the contact uses already referred to. Yet, the greatest number of people enjoy parks the greatest number of times--to an extent that probably is beyond measure--in ways that involve no physical impact on resources.

The human animal is distinguished from all other species, it seems, by its ability to perceive, understand, appreciate, and enjoy things without necessarily consuming, standing on, or riding over them. Countless times each day, a great many people take genuine pleasure from knowing that the resources taht we preserve are there--essentially unspoiled, perhaps beyond reach, at least for now--but there, now and in perpetuity, for the benefit of humankind. That vicarious enjoyment depends, to some extent, on the knowledge that there can be direct contact with those resources, even though such use may have to be closely limited--that the option is there, and will remain.

As an agency, then, the National Park Service is, perhaps above all, the preserve of options for special kinds of human experiences--direct and vicarious--expereinces whose quality is highly dependent on the integrity of resources, and on control of the impacts of various kinds of users on the special qualities of the experiences of other users.

At this point, you may be inclined to say, "Right--so ski-touring is better than snowmobiling because the X-C skier imposes less on

his or her fellow users of a park than does a snowmobiler; so, control use accordingly." Well, not quite. But in a sentence, no greater imposition of motors on park resources should be permitted in winter than in summer. And that's just what our policy says.

We, as park managers, have to reach many decisions--to use or not to use, and how much to use, for example--on the basis of professional judgement. Judgement--particularly when applied to matters whose benefits are substantially subjective, or downright emotional (and no need to apologize for that) implies the imposition of one person's or group's values on other people. The Service's extreordinary efforts to assure ample public involvement in the making of every significant decision relieves the manager of some of the burden of solitary judgements. Still, our training, our knowledge of the resources with which we deal, and the responsibilities explicitly given us by law, impose on us the necessity of value judgements.

Yet, when deciding between providing for mechanized or non-mechanized uses of a given area, there is available to us another process for filtering out a bit more of the subjectivity in decision-making.

That process is simply to force ourselves to broaden our view--to step back and look at any decision in the context of more than just the resources immediately at hand; to see the National Park System as a mosaic of natural, historical, and outdoor recreational areas; to understand that that mosaic is simply a part of a still larger one, comprising similar or related resources managed by other entities or individuals--Federal, state, local, and private.

Seen from a nationwide, or broader, perspective, that mosaic is a kind of grand ecosystem, each component of which does certain things especially well. As with any ecosystem, the health and viability of this natural/historical/recreational mosaic depend heavily on its continuing diversity. And the National Park Service can do its best as preserver of options for special human experiences only if we take great care to assure that park resources are asked to provide for experiences that do not, by their occurrence, seriously impair the qualities that make such places special.

If there is serious pressure, still, to provide for such experiences--by facility development, or by great latitude in types and amounts of use--the chances are great that a shared broadening of perspective will reveal that it can be done elsewhere, without imposition on such distinctive resources and their attendant options for special experiences.

Thus, it becomes not a matter of X-C skiing being "better" than snowmobiling, but one of making sure that options that have diminished almost to extinction are not foregone to provide for some that can readily be provided elsewhere. In the case of snowmobiles, Service policy says, essentially, that similar decisions already have been made regarding the use of other motor vehicles, and that snowmobiles generally can go, in winter, where care and motorboats can go when the roads and waters aer open. What is kept natural, and as free as possible of the sight, sound and smell of motorized contrivances in the summer is kept much the same in the winter. And it is a time when freedom from such intrusions--even intrusions by the machinery of grooming and clearing, except in emergencies--brings a combination of natural sounds, silence, and sensations unmatched in any other season.

The diverse units of the National Park System are scattered broadly along the spectrum of human experiences. Some of the areas we administer--most notably, the National Recreation Areas--can appropriately minister to the basic human need for diversity by offering, in one unit, options for a wide assortment of uses. In may, though, all but a tiny fraction of the resource must be left to sparse, low-impact, unintrusive use, if the good of the public is to be best served.

Wilderness solitude is not intrinsically better than a crowded dance floor; nor is ski-touring an experience that is, by its nature, superior to snowmobiling. But each does have its proper places, just as do most of the things we do. We generally keep certain equally important, but potentially incompatible, activities separated within our homes, for example. And maybe there is a reasonable analogy to be drawn, in the parks--which are, in a sense, some of the most special "rooms in the home of humanity," whose care requires close constraints on activities that would impose mechanized intrusion on the small remnant of wild American represented by those "rooms."

PARTICIPANT PROFILE OF BACKCOUNTRY WINTER RECREATIONISTS

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INTRODUCTION

The White Mountains of New Hampshire are within a day's drive of 60 million people in the Northeastern United States and in Canada. The area has a long tradition of resource based recreational use.

Until recently, nearly all of the dispersed recreation has taken place during the summer months. However, in the past few years, managers have observed an increase in the number of people visiting the backcountry in winter. Winter recreationists face many unusual and challenging circumstances such as short days, uncertain ground cover, the obliteration of trails and signs by snow, and cold temperatures. Because of the perceived increase in winter use, and because of the special hazards of winter recreation, managers in the White Mountains felt it would be useful to learn more about the numbers, characteristics, and information needs and sources of winter recreationists. During the winter of 1977-78 the Research Department of the Appalachian Mountain Club, in cooperation with the White Mountain National Forest and the Northeast Forest Experiment Station, Durham, NH, undertook a field study of people visiting the backcountry of the White Mountain region. The study was restricted to backcountry areas (defined as more than a quarter of a mile from a plowed road) and it was concerned only with pedestrian users, such as snowshoers, cross-country skiers, winter hikers and technical climbers.

STUDY DESIGN AND METHODOLGY

Overview

A group of trails and facilities representing a variety of use levels, geographic areas and activity types was selected. A questionnaire was designed to seek demographic data and participation patterns, and also to investigate users' information needs (see "Information Needs of Winter Visitors to the Backcountry", Edward L. Spencer and Dorothy T. Taylor). Registration stations were established at the selected trails and facilities and were monitored periodically to obtain names and addresses of non-registrants. Questionnaires were sent to a sample of registrants. Three waves of follow-up letters were sent.

Sampling Techniques

Because of the difficulties of obtaining a statistically random sample in a backcountry situation, especially in winter, a stratified sample was used. The trails and facilities selected represented a variety of geographic areas, use levels and activities. Register boxes were placed at the 11 trails and 4 facilities selected. Messages on the boxes described the study briefly and requested that everyone over the age of 14 write their name and address on one of the cards provided and deposit it in the closed compartment of the register box. Registration cards were collected from the boxes every two weeks during the survey period of December 19, 1977 to March 20, 1978.

To determine the registration rate, 152 hours were spent monitoring nine trails. Each entering recreationist who had passed a register box was asked if s/he had registered. Those who had not registered were asked to do so. Of 143 non-registrants contacted in this phase of the survey, only one refused to supply the requested information.

Questionnaire Distribution

After the registration cards were collected, a random sample of 25% was selected from the cards collected at each location.* Because of their small numbers, all non-registrants were

*Twenty-five percent was chosen because it was expected, on the basis of registration for the first two weeks and previous use patterns, to give the desired sample size.

selected to receive the questionnaire. The questionnaires were coded to maintain confidentially while enabling the researchers to keep track of returns.

Questionnaires were usually mailed a week after the cards had been collected. Included with each questionnaire was a personalized cover letter, explaining the purpose of the study and telling the recipient how and where we had obtained his/her name. A stamped return envelope was also enclosed. Follow-up letters were sent to people who had not returned questionnaires approximately 2, 4 and 6 weeks after they had received their first questionnaire. An additional questionnaire was enclosed with the second follow-up letter.

Response Rate and Validity

The overall return rate, when adjusted for the questionnaires which the Post Office was unable to deliver, was 79.2%. This ranged from 75% for the seventh mailing to almost 84% for the fourth mailing. Return rate did not appear to be related to sample size or to mailing period. There were 902 useable returns.

In an earlier study of backcountry users, Wenger and Gregerson (3) discovered some significant differences between recreationists who did and did not respond to a trailside registration station. To determine if the people who returned questionnaires for this study were representative of the entire population using the selected trails and facilities, two sub-populations were compared across a wide range of demographic and activity characteristics. People who registered voluntarily were compared to those non-registrants whose names were obtained during monitoring. People who returned the questionnaire promptly were compared with those who had not.

Registrants were compared to non-registrants across more than 50 variables. In almost all cases, differences between registrants and non-registrants were non-existant or too small to be significant. In the few cases where differences existed between registrants and non-registrants, the differences were too irregular or unpatterned to be ascribable to any systematic differences between the two groups.

One peculiar observation was made - groups with an even number of people were somewhat more likely to register than those of odd numbers. This trend was especially notable among cross-country skiers, where 96% of the skiers in groups of 2, 4, 6 or 8 people registered, but only 76% of the skiers in groups of 1, 3, 5 or 7 people registered. We are at a loss to even suggest a reason for this, and merely report it as an interesting phenomenon.

To find out if people who did not return the questionnaire differed conspicuously from those who did, the technique of Clausen and Ford (1) was used. This assumes that there is an orderly progression of attitudes and characteristics from the people who respond to the questionnaire promptly through those people who respond more slowly and to those who do not respond. Four different response time categories (before any follow-up and following each of the three follow-ups) were compared across 22 different variables. The analysis suggested that people who did not return the questionnaire may have been young, from families with high income, and travelling in large groups.

Because these trends were not particularly distinctive, and because the response rate was high, non-respondent bias was not an important problem in this study. Similarly, the lack of differences between registrants and non-registrants indicates that the sample is representative of the users of these trails and facilities. No weighting or correction factor is needed to integrate an under-represented group with the sample population before making projections and comments about user's characteristics and attitudes.

The various statistical measures of strength of relationships were not applied to the data in this study. All of these statistical measures are based on the assumption of a random sample. Although the sample of registrants used in this study was random for any given trail and mailing period, overall the sample was not a statistically random sample of all the winter users of the White Mountains. To report Chi-square or similar statistics on this data would be misleading and would suggest a level of precision of measurement which is not currently feasible when discussing a population as diverse and dispersed as backcountry visitors.

For thse data, comparisons have been based mainly of frequencies and percents. In general, a difference of less than 5% has been considered not significant, a difference of 5% to 10% slightly significant, and a difference of over 10% is considered significant. This was modified where the raw numbers were so small that one or two individuals had a large impact on the percentages.

PARTICIPANT CHARACTERISTICS

Demographic Traits

Previous studies of people who visit the backcountry have shown them to be well educated professionals with incomes above the national average who live in suburban or urban areas and who have driven more than a hundred miles to reach a backcountry area (2). These characteristics were also generally applicable to the winter visitors to the White Mountains.

Seventy-four percent of the winter users were males. The mean age of respondents in the White Mountains was 30, the median 27, and mode, 24. The oldest respondent was 70. Surprisingly, there were relatively more women (32%) in the over-35 age category than in younger age categories.

Almost all of the adults in the survey had completed high school and most had been to or were attending college or graduate school. Mean, median and mode for education were all between 15 1/2 and 16 years, or college senior/graduate.

The people contacted in the White Mountain survey lived generally in suburbs or small cities. Zip codes were used to determine that most lived in New Hampshire and in the Boston area, although some came from as far away as Alaska. Mean distance from visitor's home to Mt. Washington was about 250 miles, with a median of 160 and a mode of 150.

The most common occupations for respondents were professional ones, although there were also many students, and a wide variety of occupations were represented. Respondents' family incomes range from $0 to over $50,000 per year. The mean was about $20,000, the median in the $15,000 - $19,000 per year category.

Over half (54%) of the respondents belonged to at least one conservation or outdoor organization. Of those who did belong to such organizations, the most popular were AMC, Audubon Societies, Sierra Club and outing clubs.

Activities and Experience

Among the people contacted in this study, the most popular activity was cross-country skiing with 50% of the participants doing this, closely followed by hiking (45%). Fewer people snowshoed (28%), and very few participated in technical climbing (8%). Many people engaged in more than one of these activities during a single trip.

Age and sex affected participation in some of the activities. Young people (under 25) were more likely than other age groups to engage in technical climbing and hiking. People over 25 were more likely to be cross-country skiing than hiking, snowshoeing or climbing. There were no trends in the age of snowshoers. Women were much less likely than men to participate in technical climbing, and somewhat less likely to snowshoe or hike.

The various geographic areas from which survey participants came were not represented equally in each activity. For instance, technical climbers generally came from outside of New England and cross-country skiers were more likely than other activity groups to come from the Boston area.

People visited the backcountry in groups that ranged in size from 1 to 65 people. The mean group size was 3.9, the mode, 2. Larger groups tended to be hiking. Technical climbers travelled in smaller groups than people engaging in other activities.

Predictably, weekends were the most popular times for recreational activites. Day trips were more common than shorter or longer trips. Forty-three percent of the people were on trips that lasted 1/2 day to 1 day. Many fewer people (17%) were on short trips that lasted under 1/2 day. The rest (41%) were on overnight trips and stayed mainly in huts and cabins or in tents. Cross-country skiers were all less likely than other activity groups to take overnight trips. Large groups (over 6 people) were more likely than small groups (1-2 people) to take overnight trips. Younger people (under 25) were more likely than older people to take overnight trips. In general, the closer people live to Mt. Washington, the less likely they were to take overnight trips.

Although trailhead parking facilities can be a limiting factor in recreational patterns, especially in winter, 85% of the respondents in this survey had not experienced any problems parking their cars. Of those who did have problems, over half (57%) found parking lots crowded or too full to use, 26% had problems with icy or unplowed lots, and 17% mentioned a variety of problems on previous trips or in locations not included in this survey.

In an attempt to develop a meaningful index of experience, the survey asked questions about the number of recent backcountry trips, year of first backcountry experience, amount of participation in certain activities and self-perception of experience. In each of these categories, there was a wide range of responses. Comparisons among the various measures of experience showed a high level of agreement. Because of its simplicity, expedience and agreement with the more "objective" measures, self-perceived experience was the primary criterion used in analyzing the data for this study.

There was a correlation between group size and experience. The more experienced people were, the smaller the group that they were likely to be with. Experience also varied among the activity groups, with technical climbers being most experienced, hikers and snowshoers were generally moderately experienced, and cross-country skiers were most likely to be inexperienced.

COMPARISON WITH OTHER STUDIES

This was the first study of winter backcountry users to be conducted in the White Mountain region, and there were very few other studies which were comparable in any meaningful way. Most of the "classic" wilderness-user studies took place in significantly different areas and over ten years ago. The pattern of characteristics is similar, but the details differ too much for useful comparisons. There is a dearth of information available about dispersed winter recreation. Snowden (2) had the only other study of people involved in the same type of winter activities in a similar area. The goals of that study were different but that work provided the best comparative data on user characteristics, and also provided valuable guidelines for dealing with the practical and logistical problems of winter backcountry research.

Snowden did not report on all of the demographic data which were collected in the White Mountains. From the base of comparable information, users in the two areas appeared to be quite similar with the following exceptions. In the Adirondack study, males constituted 78% of the population, or 4% more than in the White Mountain study. This may represent a difference in activity opportunity; cross-country skiing was somewhat less common in the High Peaks area and was popular with women in the White Mountains (34% of the cross-country skiers were females). It appears that slightly more of the Adirondack users were still students, which was also reflected in a slightly lower occupational diversity than among the White Mountain users. People travelled somewhat further to reach the Adirondacks, which may merely reflect the two area's proximity to population centers. The $18,000 mean family income for Adirondack visitors is about $2000 less than that in the White Mountains. This may well be an artifact of three additional years of inflation.

DISCUSSION AND CONCLUSIONS

The main purpose of this study was to acquire baseline data on backcountry winter recreation in the White Mountains. Until there is comparable data from other locations or over time, it will not be possible to identify the extent of this type of activity or to document trends in these activities. These data, however, do contain some indications of the validity of the perceived growth in winter backcountry recreation and of the directions of future development in these activities. First, the demographic characteristics observed in this study generally correspond well with those reported in wilderness studies conducted during the summer months. The long-term stability of wilderness recreational activity indicates that the recent growth in winter recreation may also be expected to establish a stable popularity. Second, we observed a relatively high participation rate among females, especially those over 35. This may indicate simply an increase in female participation or it may suggest an unexpected family component to some winter activities. Cross-country skiing is an important element in this and may deserve observation independently of the other activities. The age of these female participants may also suggest that winter activities will remain popular as the population ages. Third, the distance people travelled to engage in these activities, with a modal distance of 150 miles, will become a more important factor. Depending on their scale, coming decreases in the mobility of the population may make recreation at this distance from home more or less attractive to many people. Finally, although the demographic characteristics uncovered here are within the bounds of those observed in past wilderness surveys, it is important to be aware of the significant diversity among these recreationists. There is no archtypical winter backcountry user. Managers must be aware of this in developing their plans, and should think in terms of ranges of user types and varieties of target audiences.

This study has also provided some experience in the application of survey techniques during winter. For the most part, the operation ran fairly smoothly. There were, for instance, fewer problems with vandalism than might have been expected during the summer. Unpredictable snow and wind patterns left some register boxes higher or lower than desired. Personnel monitoring trails had to develop special techniques for keeping warm; one person built igloos wherever he monitored! A major difficulty was general travelling conditions which made it impossible to meet planned schedules for monitoring and picking up register cards.

As one of the first studies designed to learn about the special conditions related to winter backcountry recreation in the Northeast, this provides some baseline data and establishes a number of areas where further study is warranted. It also has direct utility to managers.

In the present and short term future, the information makes managers more aware of the traits of the people using an area. This can facilitate management decisions and communications with the users. Over the longer term, socioeconomic and activity data, especially when obtained in a consistent pattern over time and space, can be applied to general population trends to make projections and predictions about future demands for backcountry recreation. This type of information is always needed by recreation planners and can have significant impact on fiscal policies and decisions.

Finally, an afterword. A standardized format

for obtaining socioeconomic information from backcountry users is needed. This would greatly facilitate comparisons of data from different areas and over time. We believe that some work is being done on this, and we support it in principle and hope that it will soon be ready and accepted for general application by all backcountry researchers. In this way, the effort which is put into obtaining socioeconomic data in many different recreation situations can be reduced and the results obtained can be more readily analyzed, compared and put to use.

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A STUDY OF SKI TOURING EXPERIENCES ON THE WHITE RIVER NATIONAL FOREST

G. E. Haas, B. L. Driver, and P. J. Brown[1]

INTRODUCTION

Many decisions require weighing of alternatives that differ along more than one attribute. Price, maintenance, miles per gallon, and color are frequently considered when deciding which car to purchase; distance, cost, and number of leisure options are frequently considered when selecting a vacation spot. The decision or choice is among multi-attribute alternatives.

The notion of "attributes" is commonly used in consumer decision theory to define actual characteristics of a good or service or characteristics attributed to a good or service by the person evaluating it (Green and Wind, 1973). Lancaster (1966) suggested that utility is not derived from goods directly but from the "want satisfying" attributes of the goods. Selection of a good or service, therefore, is largely influenced by the desired attributes it is perceived to possess. This is true for the choice of recreation goods and services.

The choice of recreation goods and services, or recreation opportunities, has traditionally been thought of in terms of choices among available activities (activity opportunities). However, a potential recreationist also weighs alternative environmental settings (setting opportunities) and alternative types of satisfaction (experience opportunities). That is, a person engages in a specific recreation activity within a specific setting to realize a predictable recreation experience (Driver and Brown, 1978). Each recreation opportunity, therefore, has an attribute profile characterized by (1) an activity opportunity, (2) a setting opportunity, and (3) an experience opportunity. Activity opportunities, such as ski touring, can be simply listed. Setting opportunities can be defined in terms of the bio-physical, social, and managerial elements perceived by recreationists. Experience opportunities are characterized by opportunities to realize bundles of psychological outcomes which provide satisfaction (Driver and Tocher 1970, Hendee 1974, Brown et al. 1979).

The objective of this study was to identify the experience opportunities preferred by ski tourers. Other papers in the proceedings focus on setting opportunities valued by ski tourers. An understanding of these opportunities is necessary for understanding demands for ski touring opportunities and for guiding management to meet these demands.

Study Area

The study was conducted on a portion of the White River National Forest near Aspen, Colorado, and is one part of a cooperative management-research demonstration project involving Colorado State University and three subdivisions of the USDA Forest Service: the Rocky Mountain Region, the Rocky Mountain Forest and Range Experiment Station, and the Intermountain Forest and Range Station (Haas and Plisco, 1979). Ski touring in the study area occurs principally on hiking trails, stream bottoms, and roads closed during the winter season. The ski touring trails are minimally groomed, signed, patrolled, and publicized.

Methods

During the 1978-79 winter, 153 ski tourers were interviewed at four sites as they left the area and were sent a follow-up mail questionnaire. The exit interview produced recreation use information and a sample frame for the mail questionnaire. The sampling scheme was stratified by interview site, weekday versus weekend, and time of day. Historic recreation use patterns provided the basis for determining how much time

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would be spent at each interview site. Interviewing was done between December 1, 1978, and April 1, 1979.

The mail questionnaire was used to identify the types of experience opportunities desired by ski tourers and to obtain socio-economic and demographic information. Experience opportunities were quantified using a 9-point response format which indicated the degree to which each outcome item added to or detracted from the level of satisfaction while ski touring in the study area. The first mailing was during May, 1979, followed at two to three week intervals by two additional mailings to skiers not responding.

Frequency analyses were done for the socio-economic and demographic variables. Item variable cluster analysis (Revelle, 1977) was used to confirm our past psychological outcome scale development work for the scale items included in the questionnaire. Those outcomes were used in NORMIX object cluster analysis (Wolfe, 1977) to identify groups of respondents who had the same pattern of mean scores. Chi-square analysis for nominal measures and analysis of variance for interval measures were done to further characterize the groups of respondents by the socio-economic and demographic variables

Results

One hundred twenty-five useable questionnaires were returned (82 percent). A non-response bias test was not made because of the high response rate and because tests in similar studies indicated that non-response bias was not a problem.

Characteristics of Ski Tourers

A typical ski tourer in the study was about 30 years old, had no children at home, had a college education, and lived in a small town (Table 1). Slightly over half (55 percent) of the ski tourers were males; three out of four were from Colorado.

Table 1. Characteristics of ski tourers visiting the White River National Forest study area (1978-79).

Characteristics	Categories	Percent (N=125)
Age (Mean = 32) (Median = 29)	Less than 20	1
	20 - 25	20
	26 - 30	30
	31 - 37	22
	38 - 44	13
	More than 44	14
Sex	Female	45
	Male	55
Family Life-Cycle	No children	70
	All children under 10 years	12
	Some under 10 years	2
	All over 10 years	16
Years of Formal Education (Mean = 16) (Median = 16)	1 - 12 (High School)	5
	13 - 16 (College)	60
	+16 (Post College)	35
Residence	Large city (500,000+)	21
	Medium city (100,000-500,000)	4
	Small city (50,000-100,000)	10
	Town (5,000-50,000)	47
	Village (-5,000)	11
	Farm	7

Psychological Outcome Preferences

The 69 psychological outcome items included in the questionnaire were clustered into 15 psychological outcomes (Table 2). Each outcome had a reliability coefficient (Cronbach's alpha) greater than 0.60. Table 2 also contains data from a 1978-79 study of ski tourers on the Arapaho-Roosevelt National Forest in north-central Colorado. That study was similar in terms of field procedure and data analysis, but the questionnaires were administered on-site (Rauhauser, 1979).

Respondents in the White River study perceived the fifteen outcomes as contributing to satisfaction in varying degrees. Relationship with Nature (e.g., scenery, close to nature), Exercise/Physical Fitness, Escape Personal Pressures (e.g., tension release, change) and General Learning (e.g., exploration, learning about nature) were perceived as strongly adding to satisfaction. Six of the outcomes were perceived as moderately adding, and four as slightly adding to satisfaction. Meeting/Observing Other People was perceived as neither adding to nor detracting from satisfaction.

The Arapaho-Roosevelt survey results were similar. Relationship with Nature, Exercise/Physical Fitness, and Escape Personal Pressures were perceived as strongly adding to satisfaction, while Meeting/Observing Other People was perceived as neither adding to nor detracting from satisfaction. The largest difference in the two data sets is the 1.0 mean difference on the Leadership/Autonomy (e.g., independence, teaching-sharing skills) outcome which was perceived as moderately adding to satisfaction in the White River study and as slightly adding to satisfaction in the Arapaho-Roosevelt study.

Ski Touring Experiences

Tables 1 and 2 describe the "average" ski tourer's characteristics and preferences for psychological outcomes. Recreation resource planners and managers can not provide only for the average user because it is likely that many would be dissatisfied. A spectrum or range of opportunities is necessary to accommodate the diverse desires of ski tourers.

Table 2. Perceived relationships of psychological outcomes to satisfaction for ski tourers.

Narrative label	White River National Forest Outcome	Mean[a] (N=125)	Standard deviation	Arapaho-Roosevelt National Forest Outcome	Mean[a] (N=930)	Standard deviation
Strongly add	Relationship with Nature	3.4	1.4	Relationship with Nature	2.7	1.0
	Exercise/Physical Fitness	3.3	0.7	Exercise/Physical Fitness	3.2	0.9
	Escape Personal Pressures	2.8	1.2	Escape Personal Pressures	2.6	1.1
	General Learning	2.7	1.1	Being with People (Friends)	2.8	1.1
				Escape Physical Pressures	2.7	0.9
Moderately add	Being with People (Friends)	2.4	1.2	General Learning	2.2	1.2
	Escape Physical Pressure	2.2	1.3	Achievement	1.8	1.4
	Reflect on Personal Values	2.0	0.9	Family Togetherness	1.5	1.4
	Achievement	1.9	1.2			
	Family Togetherness	1.8	1.2			
	Leadership/Autonomy	1.8	1.4			
Slightly add	Security[b]	1.4	1.7	Reflect on Personal Values	1.3	1.3
	Physical Rest[b]	1.3	1.6	Equipment	1.3	1.6
	Equipment	1.1	1.2	Leadership/Autonomy	0.8	1.4
	Risk Taking	0.7	1.7	Risk Taking	0.6	2.0
Neither adds nor detracts	Meeting/Observing Other People	-0.5	1.6	Meeting/Observing Other People	0.1	1.5

[a]A nine-point response format was used where most strongly adds to satisfaction and most strongly detracts from satisfaction were coded +4 and -4, respectively, with neither adds to nor detracts from coded 0. The narrative labels correspond to labels used on the nine-point questionnaire response format.

[b]Outcome items relating to security and physical rest were not included in the Arapaho-Roosevelt study.

NORMIX object typing identified three types of ski tourers in the study area. The outcome preferences for each type are shown in Table 3 and Figure 1. While the three groups valued many of the psychological outcomes similarly, they could be discriminated by their preferences for achievement (e.g., skill development, competence testing, social recognition), security (being near considerate people), to take risks (chance dangerous situations), and to meet and observe people outside their own group. Of those outcomes which are statistically ($P=.10$) different between types, we will interpret only those judged to be practically different for management purposes. For example, we believe the 1.0 range in means for risk taking represents a managerially relevant difference.

Type 1 ski tourers are more security- and achievement-oriented than the other groups. Members of this group are younger in age and have fewer years of formal education.

Type 2 ski tourers perceive other people (outside their own group) as detracting strongly from their satisfaction and do not perceive taking risks as contributing as much to satisfaction as it does for the other types. The Type 2 tourers are more likely to live in or near large- or medium-sized cities than the other ski tourers studied.

Type 3 ski tourers comprise 70 percent of the sample. Their means were close to the average of the entire sample. Like Type 1 tourers, they perceive taking risks as slightly adding to their satisfaction. Meeting/Observing People neither adds to nor detracts from their satisfaction. Type 3 tourers tend to be older and have more years of formal education.

Discussion

Because of the small and potentially unrepresentative sample and likely atypical characteristics of ski tourers visiting the Aspen area, these results might not be generalizable to other areas. Recognizing these limitations, some implications can be drawn which demonstrate how an understanding of preferred experience opportunities might be useful to recreation planners and managers.

The experience opportunity information in Table 2 tells managers which psychological outcomes were most satisfying. The first six outcomes were the same six for both studies reported in Table 2. Object typing (Table 3 and Figure 1) provided additional information and shows that the skiers did differ in their preferences for several psychological outcomes. These differences reflect needs for management actions directed toward providing options for more security for the Type 1 ski tourers and for avoiding too many people for the Type 2 ski tourers. These data help define what is commonly preferred by all the ski tourers sampled and what is differentially preferred by different ski touring market segments. That information can be used to diversify the "market choices" of the users.

Assessing demand for ski touring experience opportunities is more informative than simply assessing demand for ski touring. For example, instead of referring to a 10,000 visitor-day

Table 3. Statistically significant psychological outcome mean scores for three types of ski tourers.[a]

Psychological outcome	Overall Mean (N=125)	1 (N=14; 12%)	2 (N=20; 18%)	3 (N=80; 70%	ANOVA F-Value	Group Differences
Relationship with Nature[e]	3.4				NS[b]	
Exercise/Physical Fitness[e]	3.3				NS	
Escape Personal Pressures	2.8				NS	
General Learning	2.7				NS	
Being with People	2.4				NS	
Escape Physical Pressures	2.2				NS	
Reflect on Personal Values	2.0				NS	
Achievement	1.9	2.7	1.7	1.9	4.809[c]	1>3,2
Family Togetherness	1.8				NS	
Leadership/Autonomy	1.8	2.3	1.5	1.8	2.821[d]	1,3,2
Security[e]	1.4	3.8	1.6	0.9	24.194[c]	1>2,3
Physical Rest	1.3				NS	
Equipment	1.1	1.6	0.7	1.1	2.760[d]	1,3,2
Risk Taking[e]	0.7	0.9	-0.1	0.9	4.867[c]	1,3>2
Meeting/Observing People	-0.5	-0.3	-3.0	0.2	42.790[c]	3,1>2

[a]A nine-point response scale was used where most strongly adds to satisfaction and most strongly detracts from satisfaction were coded +4 and -4, respectively.

[b]NS indicates that the means of the three types of ski tourers did not significantly differ.

[c]p = .05 [d]p = .10 [e]Used for NORMIX object clustering

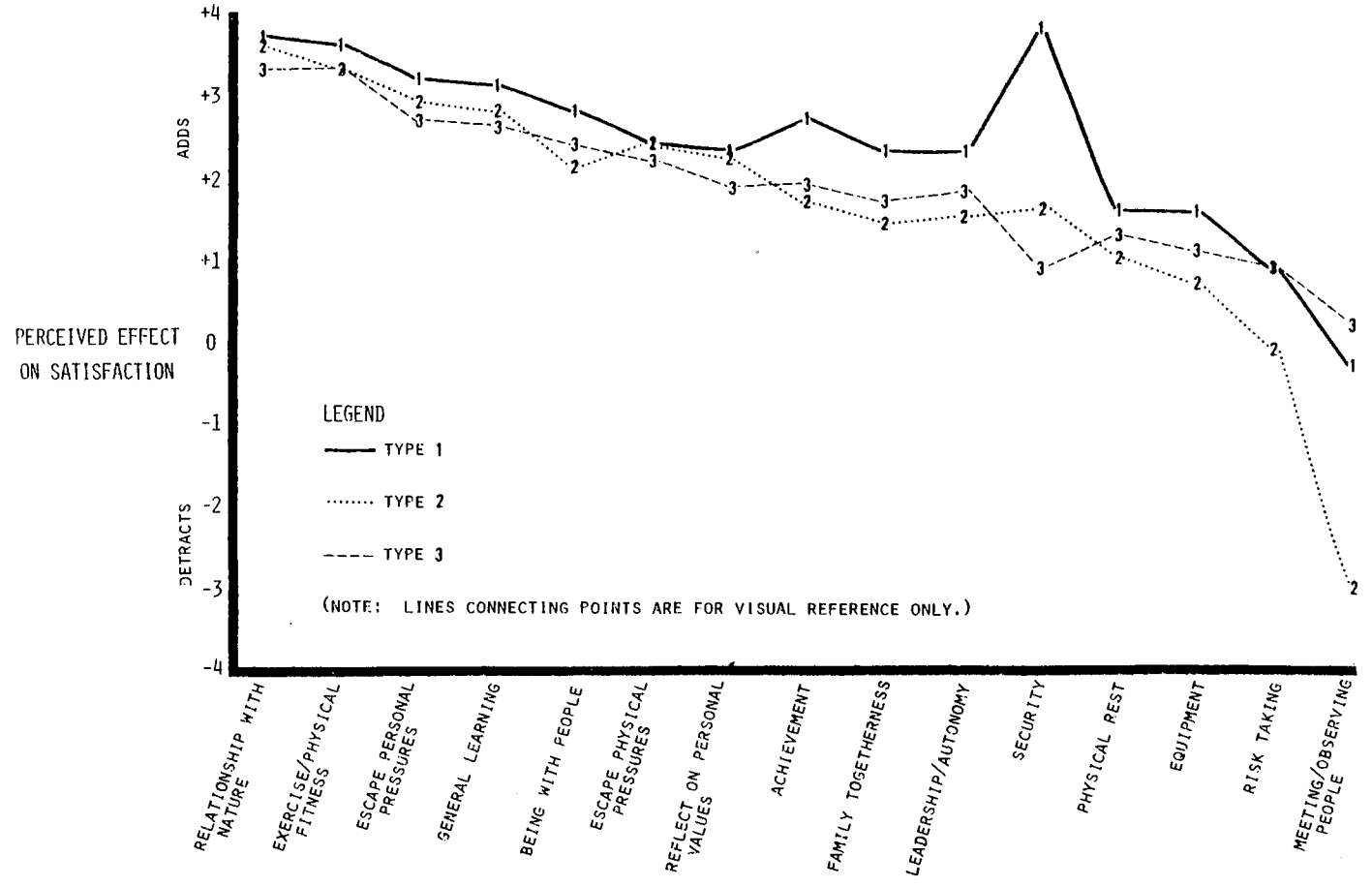

Figure 1. Psychological outcome profile for three types of ski tourers in the study area.

demand for ski-touring, it is more informative to know that there is a 1,200, 1,800, 7,000 visitor-day demand for Type 1, Type 2, and Type 3 ski touring experience opportunities, respectively. Since there is a larger demand for Type 3, management would likely want to provide more opportunities for these ski tourers.

Understanding the experience opportunities which people desire suggests something about the environmental conditions which can be supplied. For example, solitude-oriented opportunities might be supplied in areas where the trails go to remote areas not frequented by large numbers of users, whereas opportunities for security can be offered in areas where predictability and safety can be assured by management.

As more and more people seek snow-related recreation opportunities, conflicts are bound to arise. These conflicts are often psychological in nature and occur not only between participants of different activities, but also among participants in one activity. One way to help avoid declining quality recreation experiences is to understand the types of experience opportunities that are in conflict. For example, our data suggest that the quality of the recreation experiences likely could be enhanced if Type 1 ski tourers were separated from Type 2 ski tourers because of their different preferences for meeting/observing people. Management objectives could be written accordingly.

Management objectives should specify some preferred state or end product. By specifying the experience opportunities to be provided, a management objective can be written more clearly. An example of an experienced-based management objective might be:

> To provide and maintain the Independence Pass area for moderate-high visitation levels for novice ski touring experiences which focus on achievement (skill development and testing) and security over the 1980-85 planning period.

Experience-based management objectives can guide the selection and implementation of management tools. For example, if the objective is to provide the Type 1 ski touring experience opportunity, managers might consider providing a trail that is groomed, relatively short (3 miles), gently sloping through forested and open areas, well signed, periodically patrolled, and having a trailhead bulletin board, and parking and toilet facilities.

One specific management tool for which experience opportunity data would be useful is in designing a visitor information/education program involving trailhead bulletin boards, brochures, maps, and visitor information specialists. Managers could use experience opportunity descriptions in information/education provided for users in order to match ski tourers' preferred experience opportunities with what is offered on-site, to provide ski tourers with a better information base to compare areas and choose the experience opportunity they wish to have, and to enhance the credibility of the managing agency.

Considerable research is still needed to understand ski touring more completely. Research needs to be conducted in different locales, incorporating study of additional psychological outcomes and bio-physical, social, and managerial attributes, and incorporating different methodological approaches. Such research will help managers better understand the ski touring consumer and match supply to demand.

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OPERATIONALIZING THE CROSS-COUNTRY SKIING OPPORTUNITY SPECTRUM

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A major goal of public outdoor recreation management is to provide satisfying recreational experiences for users. Several authors have suggested that because of the diverse motivations, tastes, and preferences of the public this requires providing a wide range of recreational resources, settings, facilities, and policies (Wagar 1966, Lime 1976, Merriam and Knopp 1976). This concept of providing a wide range of recreational environments is known as the opportunity spectrum concept.

According to Stankey (1977), "The basic premise of the recreation (opportunity) spectrum concept is that a variety of environmental settings from the 'paved to the primeval' (Nash 1967) is needed to fulfill the many needs, motivations, and preferences that lead people to participate in outdoor recreation." Thus, it acknowledges the importance of determining why people recreate in terms of the kinds of satisfactions and benefits that for them define a high quality recreational experience, as well as determining the kinds of physical settings they prefer (Driver and Brown 1978).

The purpose of this paper is to operationalize the cross-country skiing opportunity spectrum. As conceived here, this is a four-step process involving:

1) establishing why people cross-country ski, i.e., what kind of satisfactions and benefits they expect from participating;

2) identifying different types of cross-country skiers who are distinguished from one another on the basis of the kinds of satisfactions and benefits they seek from cross-country skiing;

3) determining skier preferences for a wide range of attributes of the cross-country skiing setting which are controllable by management; and,

4) deciding whether or not different types of cross-country skiers prefer different settings.

Following this process will help determine the extent to which we can actually "manage for" different cross-country skiing experiences.

SURVEY METHODS

The data base for this study came from a state-wide mailed questionnaire survey of 944 randomly selected Minnesota cross-country skiers conducted in the fall of 1978. These individuals were identified through an earlier state-wide telephone survey of nearly 10,000 randomly selected Minnesota households made by the Minnesota Department of Natural Resources as part of the 1979 Minnesota SCORP research effort. After four follow-up letters, an adjusted response rate of 75 percent was obtained.

Four kinds of information were gathered by the questionnaire: 1) descriptive information about Minnesota cross-country skiers, 2) data on the nature of their participation, 3) an indication of the importance they attribute to various psychological and social satisfactions and benefits associated with cross-country skiing participation, and 4) their preferences for many different attributes of the cross-country skiing setting.

REASONS WHY PEOPLE CROSS-COUNTRY SKI

To determine why people cross country ski, respondents were asked to indicate the importance to them of each of 35 reasons for cross-country skiing by checking a 6-point scale labeled from "not at all important" to "of utmost importance." These items were selected from the Driver (1977) item pool designed to measure expected consequences from engaging in recreational activities. These consequences of recreation participation are important because they, rather than the activities, are the real "final products" of recreation resource management (Driver and Brown 1978).

Cluster analysis of responses using the BMDP1M cluster analysis of variables computer program (Dixon et al 1977) produced six multi-item scales representing different satisfactions and benefits motivating substantial numbers of respondents. Based on a judgement of the

underlying dimension common to the items in each scale, they were labeled: exercise/fitness, experiencing nature achievement, social contact, escaping physical and social pressure, and family solidarity (Table 1). The relative importance of each satisfaction/benefit is indicated by the overall scale mean.

Table 1. Cross-country skiing satisfaction/benefit scales resulting from the BMDP1M cluster analysis of 25 questionnaire items.

Scale	Mean	No. of Items	Av. Cor.	Rel. Coef. [1/]
Exercise/ Fitness	4.2	2	.70	.82
Experiencing Nature	3.6	5	.56	.93
Achievement	3.3	4	.42	.81
Social Contact	3.2	2	.63	.77
Escaping Soc. Phys.Pressure	3.1	7	.52	.96
Family Solidarity	2.8	2	.84	.91

[1] Reliability Coefficient = $\frac{n\,r}{1 + (n - 1)\,r}$

where: n = number of items in scale
r = average inter-item correlation

SEGMENTING CROSS-COUNTRY SKIERS INTO TYPES

The constraints and limitations of management generally make it practicable that groups rather than individual recreationists be catered to. The second step in operationalizing the cross-country skiing opportunity spectrum was, therefore, to identify groups of individuals who have similar motivations for cross-country skiing. This general method of segmenting recreationists into groups on the basis of the expected benefits and satisfactions derived has been used in a number of other outdoor recreation studies (Brown et al 1977). "Benefit segmentation" is borrowed from the field of market research where it has been utilized for several years to better define markets for consumer products (Haley 1968).

Using the BMDP2M cluster analysis of cases computer routine, an attempt was made to classify the 564 respondents for whom scale scores had been calculated into different groups on the basis of the similarity in their satisfaction/benefit profiles. This analysis resulted in the formation of eight different groups or types of cross-country skiers (Figure 1). Seventeen percent of the individuals could not be classified into any of the eight groups. Individuals in each group were alike in that they placed roughly the same importance on the six satisfactions and benefits as other individuals in their group. This segmentation analysis is covered in more detail elsewhere (Ballman 1979).

These eight cross-country skier types can be thought of as representing eight different definitions of high quality cross-country skiing experiences. For example, type 6 skiers considered exercise/fitness, achievement, experiencing nature, and escaping pressures as very important in defining high quality skiing experiences. Type 4 skiers, on the other hand, considered social contact and family solidarity along with exercise as very important in their definition of high quality experiences.

DEPICTING A RANGE OF SKI AREA ATTRIBUTES

The third step in operationalizing the cross-country skiing opportunity spectrum was to determine skier preferences for attributes of the cross-country skiing setting. To be most useful for management purposes, these attributes should represent aspects of the setting controllable by management. Seven such broad aspects were used as criteria to define the cross-country skiing opportunity spectrum in this study:

* trail characteristics
* level of amenities/facilities development
* level of encounter with other skiers
* proximity to other types of use
* general degree of ski area naturalness
* ski area location.
* vegetative cover type

Fifty-two questionnaire preference items depicted a range of conditions within each of these seven criteria. For example, the following four items represented a range of the criterion "level of encounter with other skiers":

* encountering nobody else while skiing
* encountering a few other skiers (5-10 per hr.)
* encountering a lot of other skiers (40 + per hr.)
* encountering large groups of skiers (10 + people).

The other six criteria were similarly represented by preference items depicting a range of conditions within each criteria.

DIFFERENCES IN ATTRIBUTE PREFERENCES AMONG CROSS-COUNTRY SKIER TYPES

The final step in operationalizing the cross-country skiing opportunity spectrum entailed identifying differences in preferences among the skier types. Since each of the eight types represented a different kind of cross-country

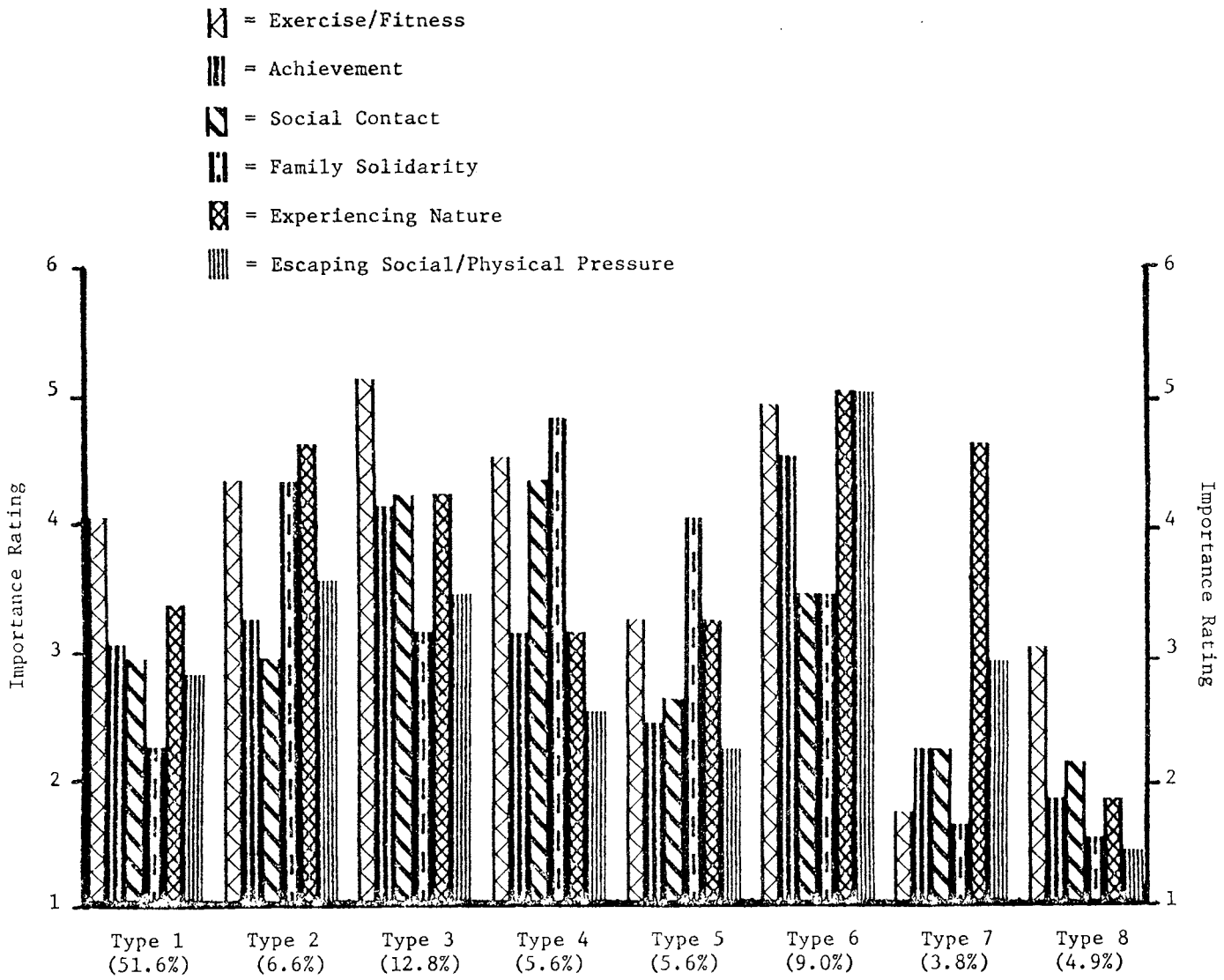

Fig.1. Importance ratings of six satisfactions/benefits from cross-country skiing for eight types of cross-country skiers (N = 467)

skiing experience, it would be expected that there also exist some differences in the attribute preferences of each type.

One-way analysis of variance was used to test for differences in the preference scores of the eight cross-country skier types on each of the 52 ski setting attribute items. Where significant differences existed Turkey's Honest Significance Difference test or the Least Significant Difference test was used to identify the specific types which differed. Significant differences were found on 15 of the 52 items. For only one criterion, "proximity to other types of use", were there no items on which the types differed.

One of the most important considerations in creating new cross-country skiing facilities is what kind of trails to construct. The length, difficulty, configuration, and degree of grooming are some trail characteristics on which decisions must be made. Six of the 15 items on which skier types differed represented trail characteristics. Types 5 and 7, for example, were neutral in their opinions concerning "trails at least 25 miles long" while types 4 and 8 thought they were undesirable.

Opinions also differed on the desirability of various levels of trail difficulty. "Moderately steep hills (about 15% slope)" were seen as desirable by types 2,4 and 6, but types 7 and 8 were neutral in their opinion on them. "Trails requiring a high degree of skill" were viewed as undesirable by type 5, but type 6 was neutral toward them. Types 6 and 7 were neutral about "downhill runs with curves at the bottom" but types 8, 5 and 2 saw this as undesirable. Type 6's greater orientation toward natural conditions was evidenced by their seeing "breaking my own trail through unbroken snow" and "trails that have been tracked only by other skiers" as desirable. Types 4 and 8 were neutral regarding breaking their own trail; and types

4, 8, 1, 2, and 5 were neutral about trails tracked only by other skiers.

A characteristic of cross-country skiing often cited as contributing to its growth rate is the notion that one can avoid the crowds associated with downshill ski areas. Results indicated that crowds are not desirable but that encountering a few people generally does not detract from the quality of an individual's experience. Only regarding encountering nobody else did the skier types differ significantly. Types 6 and 2 considered a zero encounter level as desirable while type 8 skiers were neutral on this encounter level.

One of the areas of greatest expenditure by agencies may be in providing user amenities (signing, information, and support facilities and services). Because of this and the fact that they are generally seen as desirable by users, it becomes very important to establish which ones are most preferred and by whom. Twelve amenity preference items were included on the questionnaire. Overall, responses indicated that amenities which provide information to users such as pocket trail maps, trail route, distance, and difficulty signs are viewed as most desirable. Some more elaborate facilities such as warming houses and rest stops were also viewed positively.

Cross-country skier types differed significantly on four of the twelve amenity items. Two of them dealt with skier safety: "warning signs before steep hills and junctions" and "ski patrol on trails." Respondents were generally positive concerning warning signs but neutral toward training ski patrols. Type 7, however, with a neutral response regarding warning signs, was significantly lower than types 2, 3, and 4, all of whom saw them as desirable. Also, type 7 skiers along with type 6 were neutral concerning ski patrols whereas type 4 skiers preferred them.

The other two amenity items on which skier types differed related to lodging and winter camping facilities. Type 2 cross-country skiers saw both developed overnight facilities and primitive winter camping facilities as desirable. Scoring significantly lower on overnight facilities was type 5 and on primitive camping facilities types 1, 4, 5, 7, and 8.

The satisfaction/benefit profiles showed that experiencing nature was one of the most important motivations for many skiers. The respondent's preferences on the five items related to the degree of ski area naturalness were consistent with this. They indicated, for example, that such things as seeing wildlife and no man-made developments were desirable while powerlines, residential development, and sounds of autos were not.

Significant differences among types were found on two of these. Types 2, 5 and 8 were neutral about not seeing man-made developments but types 6 and 7 thought this would be desirable. Although types 2 and 8 were significantly more positive than type 6 concerning the desirability of seeing powerlines and similar man-made structures, all types were negative on this item.

Other items related to ski area naturalness were those depicting different ski area vegetative cover types. Responses to these showed wooded areas to be more desirable than open areas. Types 2, 6 and 7 thought skiing through wooded areas was significantly more desirable than types 5 and 8 did.

The final criterion used to define the cross-country skiing opportunity spectrum which revealed significant differences among skier types was ski area location. Areas located within a short distance of home were viewed positively by all types of skiers. Most respondents were neutral regarding remote, hard to reach areas but type 8 skiers viewed this as undesirable and were significantly lower than types 6 and 7.

CONCLUSIONS AND MANAGEMENT IMPLICATIONS

Two main conclusions can be drawn from this study relative to operationalizing the cross-country skiing opportunity spectrum. First, some controllable attributes of the skiing setting differentiate among skier types better than others in terms of their ability to provide high quality experiences. The evidence suggesting this was that on 37 of the 52 preference items, skier types did not differ significantly but on 15 they did. It is important to know which management actions will effect different experiences differently and which will have about the same effect on all users.

It is noteworthy that overall mean response scores to items on which the eight skier types did differ were distributed across the entire response range from very undesirable to very desirable. This suggests that the relative desirablility of attributes is independent of how well they differentiate among skier types (or different definitions of high quality experiences).

A second major conclusion is that some types of experiences can be provided with more precision than others. This is illustrated by the fact that types 1 and 3 were differentiated by only two items while type 6 was differentiated

by twelve (Table 2).

Table 2. Skier type sizes and number of attribute preference items on which they differed significantly.

SKIER TYPE	SIZE	NO. ITEMS
6	9.0	12
8	4.9	10
2	6.6	9
5	5.6	8
7	3.8	8
4	5.6	6
1	51.6	2
3	12.8	2

This means that we may have more management "handles" on the type 6 definition of a quality experience and that it may also be more difficult to provide. This takes on greater importance when it is noted that type 6 skiers had the highest participation rate and a greater percentage of them said they planned to do even more skiing in years ahead than any other type.

When evaluating these results with respect to management implications, the size of each of the eight cross-country skier segments is of crucial importance. The segments ranged in size from 3.2 percent (type 7) to 42.8 percent (type 1) of those for whom typing was attempted. Based on the 1978 Minnesota Department of Natural Resources estimate of 500,000 cross-country skiers in the state, that translates into segments ranging in size from 16,000 to 213,000 individuals. The relevant management issue then becomes to determine the minimum size segment for which it is practicable to manage the resource.

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EVOLUTION OF DEMAND AND AGENCY RESPONSE TO DISPERSED WINTER RECREATION IN BRITISH COLUMBIA

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THE BRITISH COLUMBIA SCENE

In the varied landscapes of the province all forms of dispersed outdoor winter recreation are pursued. Some, such as heli-skiing, ski-touring and snowmobiling are known to generate major economic returns to the province from tourism, as well as equipment sales (1). All activities have exhibited rapid, in some instances exponential, growths in participation by both residents and visitors. Certain activities, such as heli-skiing, are pursued primarily by tourists from outside the province. Other activities, particularly cross-country skiing, are often undertaken close to home, involving relatively little expenditure of time, becoming the winter equivalent of an afternoon trip to the beach on a sunny Sunday in summer. However, it is important to remember that even with the recent growth in such activities, B.C. and Alberta are the only provinces in Canada where participation in cross-country skiing does not exceed that for downhill (2).

The growth in demand which began to increase rapidly in the late sixties shows little sign of slowing. Snowmobiling, which was perhaps the first activity to exhibit rapid growth, continues to show increased sales of 10% annually. Other activities continue to exhibit even more spectacular growth (heli-skiing has grown 50% annually throughout the seventies). The mid seventies were also characterized by a period of market fragmentation and specialization which further emphasizes these increases (3). It is no longer sufficient to simply talk of cross-country skiing since ski touring, ski racing and ski mountaineering can already be recognized as derivatives of the "original activity". Under each of these sub headings there are further specializations each of which have shown dramatic increases in participation.

Examples of the increases in use are found everywhere. It is now common to have 2,000 competitors at one of the many ski marathon races held each winter in various locations around the province. The provincial Parks and Outdoor Recreation Division has recently developed a number of new cross-country trail systems for purely recreational skiing. Each area may have parking for as many as two and three hundred vehicles, where there are line-ups and overflow parking almost every weekend and on many weekdays.

At the outset of this paper the remarkable variety of landscape in the province was mentioned. This variety results in ideal terrain and snow conditions for all forms of dispersed winter recreation, a variety which is probably not to be found anywhere else in North America. This variety and the millions of acres of unspoilt, unpopulated and inaccessible land make the province a literal wonderland with almost limitless potential to accommodate continued expansion in recreational use. However, even here conflicts have arisen between the various activities and the lack of sufficient facility provision in key locations of heavy demand has restricted participation in certain activities.

Public Agency Roles in Outdoor Recreation

Publicly owned, or Crown land accounts for 97% of the land area of the province and is situated outside the major population centres (4). Public recreation today is largely accommodated on land and facilities under the jurisdiction of the Provincial Parks and Outdoor Recreation Division (of the Ministry of Lands, Parks and Housing) and the Ministry of Forests. These two agencies also regulate all Crown land recreation.

It has not always been this way. The organization of government responsibility for outdoor recreation has changed in the last decade. Some of the impetus for this change was generated by increased participation in dispersed winter recreation. This paper will consider the examples of two activities - snowmobiling and cross-country ski touring, and the inter-relationships between government organization and the growth in these two sports.

In the late 1960's, snowmobile ownership in the province was only just beginning to climb

from near zero to, an estimated, 45,000 machines in 1979 (5). Participation in cross-country skiing (or nordic skiing as it was more generally known) was not recorded at that time, but is known to be low and to have increased later; by 1976, 56,000 persons participated in this activity.

Only one provincial government agency was actively involved in the provision of outdoor recreation areas and in the regulation of recreational activities - the Provincial Parks Branch. Trends in summer time recreation, for example the overflow of campers from designated Park campgrounds to undeveloped public lake frontage, and the growth in the popularity of hiking, were already forcing Provincial Forest Service staff to re-assess their role as being solely to control the commercial production of wood for harvest.

At that time too the Provincial Parks Branch was primarily concerned with the provision of a variety of summer use parks. Emphasis was placed on the protection and presentation to the public, of unique and highly attractive pristine environments. Provision of outdoor recreation opportunities was regarded as a secondary role to be fulfilled after this primary objective was achieved. Only activities which were considered to be in harmony with and not detrimental to the goals and objectives of the park system, were permitted in Provincial Parks. The growth in first snowmobiling and then cross-country skiing, emphasized the need for the province to re-assess the role of these two key agencies (growth in other activities, particularly summer off-highway vehicle use further emphasized this need).

The snowmobile was regarded as a confounded nuisance by conservationists who objected to its noise, environmental impact and the threat to public safety. Snowmobilers were almost universally regarded as being young men who enjoyed chasing deer.

This public concern was shared by management agencies and, after reviewing the early experiences in the United States and Eastern Canada, the Provincial government passed the All Terrain Vehicle Act under which the snowmobile is still the only regulated vehicle (6). The government also closed all Provincial Parks to snowmobile use.

This was the beginning of the phase of Government Resistance.

For the snowmobile user however, the snowmobile was a release from the months of winter hibernation, particularly for non-urban residents (less than 25% of the population). The sport was exciting and access to remote and beautiful areas was possible. Snowmobiles were also convenient for work and added greatly to winter safety in isolated areas.

Across Canada confrontation between government and user groups grew. Consequently and with the assistance of the snowmobile industry, the users began to form clubs and associations to improve snowmobiler behaviour, provide the facilities which government seemed unprepared to build, to pressure government for assistance and to build a positive public attitude to the sport.

At this time snowmobilers were required to register their machines and buy gasoline, which were both taxed, and yet they received no government services.

The clubs were able to mobilize considerable funds and volunteer effort. A full time coordinator was hired for the province. Trails were cleared on Crown land and club chalets constructed, sometimes without permission. However government in-action was continually encountered because no agency was responsible for coordinating the provision of recreational opportunities outside Provincial Parks, and for assisting organizations in making application for the various permits required for the use of Crown land.

Elsewhere in Canada and the United States a number of private, commercial enterprizes have been established to serve snowmobiles, particularly tourists. In British Columbia no similar trend has emerged. This may be due to the lack of recognition for the sport in either the provision of designated use areas or established trail systems. The availability of extensive tracts of attractive public lands has meant that designated use areas were not necessary in the past. But continuation of this situation has held back the development of the sport for both residents and tourists.

This was the phase of Government Inactivity.

The clubs became a highly influential and respected lobby for snowmobilers (with a total membership in 1974 of 20,000). However the growing popularity of cross-country skiing was resulting in more serious conflicts. Many areas previously opened up by snowmobilers were sought as cross-country ski areas. The two activities were considered to be in conflict and cross-country skiing was regarded as more environmentally acceptable by many influential decision makers and lobby groups.

Thus was entered a phase which continues today. It includes not only cooperation between government and clubs in the provision of use areas but also the provision, by government, of user facilities in a very limited number of situations. Government also provides funding

for safety education and sponsors limited experiments in permitting the use of snowmobiles in certain Provincial Parks. Increasing numbers of decision makers and concerned citizens acknowledge that the environmental impacts are not as severe as was originally expected. However the government has also moved to close certain Crown land outside Parks, to snowmobile use. These closures have been achieved only after discussion between user groups and government staff, following the process which was recommended by a 1976 study by the Outdoor Recreation Council (of user groups) (7) and recognized in a 1978 government policy paper (8).

The future of recreation lies with cooperation between users, government agencies and private commercial operations. The past situation, when the government provided all public recreation opportunities, cannot be continued in an era of government cut-backs in the face of rapid inflation of costs. Snowmobilers have gained by their preparedness to accept responsibility for their use areas.

This is the phase of Government Acceptance.

Before considering this present situation in more detail it is useful to consider the parallel, if somewhat delayed, evolution of cross-country skiing.

The Role of Government in Cross-Country Ski Management

Government response to the explosive growth in the popularity of this sport exhibits some surprising similarities with the snowmobile example. This is not of course, due to government attitude to the sport - which was regarded as far more environmentally harmonious than snowmobiling. The response reflects the difficulty experienced by government in determining whether a new sport will be a fad or will become an established activity.

Thus the first phase was one of Government Inaction.

Inaction was also due in part at least, to a factor which highlights a similarity in impact if not in activity between the incompatible mechanized and non-mechanized users. Neither activity focuses on a single location, as do most summer activities. However the Parks Branch was the only agency established to provide Crown land recreation, and was responsible only for parks. In many areas of the Province there are extensive tracts of land which are far more attractive for winter recreation than for summer use, but on these lands no agency was responsible for providing or managing public recreation. Overriding concern about the impacts of snowmobiling obscured this deficiency which only became obvious when the initial steps were taken to provide resolution of the growing conflicts between skiing and snowmobiling and to provide opportunities for these two expanding activities.

An important aspect of the initial phase in the evolution of cross-country skiing was the early participation of the commercial sector. Ski club membership expanded in parallel to the snowmobile clubs and with similar objectives - the designation, development and management of trails. The product has been a widely dispersed system of trails both in and around established downhill ski areas and in quite separate areas. For example a system of trails in the Cariboo Region (where no downhill ski areas exist) has been developed cooperatively by hotel operators and clubs. These run across both Crown and private lands. These attract tourist and resident use.

Government participation was not long delayed but the phase of Government Acceptance and Participation has been patchy.

In a number of Provincial Parks cross-country ski trails have been and continue to be developed. These range from intensively developed and managed facilities to making summer facilities available for the occasional winter user.

In most regions of the province provincial parks are either not suitable for dispersed winter use or not ideally located in comparison with other Crown land. Facilities have been developed on this Crown land, by the clubs and the private, commercial operators with the government playing a passive or even obstructionist role. Funding has been gained from Federal Government job creation programmes, from club dues and from business development money (in the case of the private sector). The government merely acknowledged the existence of the facilities, often un-officially.

In the late Seventies the Ministry of Forests was created with responsibility for outdoor recreation on forested land outside parks in recognition of the growing problems with outdoor recreation on forest land. A positive role in planning and managing this land use has evolved rapidly and continues today.

Cross-country skiing, like snowmobiling, has provided some of the impetus for these changes. The growth of Cross-Country added one more element, conflict. Previously snowmobilers had enjoyed exclusive winter use in those areas where they were permitted. As skiing grew so did conflict between users.

A New Role for Government

The Problems

. A number of situations have highlighted management problems and forced a change in government organization.

- Extensive use of trails on Crown land by participants in both activities has resulted in requirements for funding mechanisms and management regulations to provide some controls and assist the development of facilities and to ensure their protection.

- Conflict between the groups in their demands for land demonstrated the need for a planning process and land designation mechanism to ensure equitable provision of adequate areas and facilities.

- Lack of necessary services, in particular the provision and maintenance of access, have highlighted the need for a government programme to encourage and manage dispersed winter recreation use.

- Accidents; resulting in death, injury and considerable cost for search and rescue, in both intensive use and wilderness areas highlighted the almost total lack of supervision in the use of areas, regulation of commercial enterprise or training of users and entrepreneurs.

The slow initial government response to these growing problems exacerbated those situations but also, as has been discussed, resulted in participation by user groups which is now having a fundamental affect on government involvement in managing public outdoor recreation. Government is moving away from only designating, developing and managing a relatively restricted system of parks. Instead an emphasis is now placed on planning and regulating use areas and trails which have been planned, developed and policed in cooperation with user groups. In fact, the earliest examples of cooperation between the groups took place entirely without government intervention in situations such as the designation of use areas by skiers and snowmobilers at Silver Star (a major ski area) and the Outdoor Recreation Council presentation to government on the future of Off-Highway Vehicle management in the province (9).

Recent History of Government Re-organization

The issue of government management of wildland recreation in British Columbia first became a major issue in 1975. A series of seminars were held throughout the province culminating in a presentation to government which, amongst other things, called for the creation of an Outdoor Recreation Branch (of the Ministry of Recreation and Conservation) and the recognition by government, of a Council of recreation user groups (10). Since that time much of the spirit of those proposals has been absorbed into stated government policy.

In 1979 the Parks Branch became the Parks and Outdoor Recreation Division, of the Ministry of Lands, Parks and Housing, charged with responsibility for coordinating all provincial and regional planning of public outdoor recreation and for regulating all activities as well as the system of Parks and Recreation Areas. The Ministry of Forests Recreation Branch created in 1979 is responsible for planning and managing the recreation use of all forest land. Both Ministries have recognized the importance of user group cooperation in all aspects of their work and through regular public participation, government sponsored work parties and various management agreements between clubs and government, the relationship between recreation agencies and the user is undergoing a dramatic change.

Dispersed winter recreation was not the prime cause of this shift but as earlier sections of this paper have demonstrated, problems with these pursuits highlighted problems with the old organization. The adversity due to agency opposition or inactivity also forged strong user group organizations and an independant private sector.

The re-organization of government services has not solved the problems which were highlighted at the beginning of this section but they have established an effective mechanism for dealing with them. The early indications are positive since a number of examples of problem resolution had been put into practice before the official re-organization occurred.

The Forest Service had been working with a number of groups throughout the Province to provide secure tenure for club houses and trails and by sponsoring these groups, had assisted their efforts to obtain funding for the development of facilities (11). The new Ministry of Forests can now designate and therefore protect those trails and must take recreation interests into account when planning forest land uses (12).

Although officially restricted to work solely on Provincial Park concerns, the former Parks Branch became heavily involved in coordinating all outdoor recreation planning. Now the Parks and Outdoor Recreation Division is charged with administering the All Terrain Vehicle Act (which may become the O.H.V. Act) and with coordinating all provincial outdoor recreation planning. Consequently a number of regional committees of concerned user groups (Outdoor Recreation Councils) have been invited to act as sounding boards for government proposals (13).

Regulations have always been highly

restrictive and therefore somewhat inflexible. The new provincial policy on the registration and training of heli-ski operators and ski-touring schools and companies is an example of a significant departure from this trend. These companies are asked to cooperate and take a responsible attitude by observing standards and training staff rather than by compliance with a set of regulations (14).

Despite these changes overall progress is slow and lacks an overall plan. User group conflicts tend to be dealt with in an ad hoc process which only considers the immediate problem on a site specific basis. Regional plans involving user groups, are necessary. However before plans can be prepared more information about existing use areas and trails is required. To obtain this will require enormous amounts of work on the part of user groups but it will be a cornerstone in gaining greater recognition for the various trails and use areas and in ensuring their protection from competitive resource use.

The Future of Dispersed Recreation in British Columbia

It is not possible to predict the future behaviour of the demand curve for these activities. However it is reasonable to predict that participation will continue to rise and that new aspects of presently popular pursuits will spring up with new demands on resources, management and planning.

The evolution of regional Outdoor Recreation Councils, where users can discuss problems and various plans with agency staff, has only just begun. If these bodies are successful or if only the process of increased public contact bears fruit, the province will be better able to deal with future developments in outdoor recreation demands. The increased understanding, coordination and improved problem solving which results from these groups far outweighs the time delay experienced in making decisions through such a consultative process. Experience with the groups has been positive to date and it is likely that existing groups will continue to function and, seeing their example, others will form.

Tourism is the province's third industry and continues to expand. Dispersed winter recreation is one aspect of tourism which has received limited attention in the past but with the vast potential of the land base it is quite likely that this industry will grow with government assistance. The relatively small examples already found in the Cariboo region might be expanded and replicated elsewhere until a system of use-areas developed, used and managed jointly by commercial interests, government agencies and the user groups, is developed. Involvement of the commercial sector will be one of the important issues in the future.

As we have seen, the role of government has been far less dominant in dispersed winter recreation than in the various summer activities. Only recently has a switch been made from an antagonistic and inactive role to a supportive and active role. It will be essential to preserve the positive aspects of that earlier role. The heavy involvement of user groups in all aspects of the system reduces costs while tending to result in facilities which are tailored to user needs. The government provides the necessary controls and regulations which ensure fair play and protect the interests of the general public. Government money is also key to providing an attractive system of recreation facilities.

Some problems still exist. The task of overall policy and plans may result in a number of false starts down blind alleys. New agencies and organizations always require a considerable "shake-down" period and expected legislation and funding assistance always takes time and is often too little too late. However in British Columbia it can truly be stated that as a result of the experience of the late seventies, the management agencies are offering the recreating public a unique opportunity to assist in the future provision of their parks and recreation areas. For the recreation agencies the future challenge will be to resist past tendancies to take over all aspects of planning and managing public recreation. However the sheer volume of demand and current astringencies in public sector budgets will, in all likelihood, sharply curtail any such tendancies.

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SKI TOURING IN THE TWIN CITIES AREA

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Over the past ten years ski touring has been one of the fastest growing natural resource-related recreation activities. A variety of reasons have been given for this growth (low cost, ease of learning, the overall environmental movement, etc.). Whatever the underlying reasons are, the growth in ski touring has been particularly fast in the Minneapolis-St. Paul metropolitan area. This growth has proved to be both a blessing and a problem for recreation providers in the region. On the one hand, it provided an appropriate use for many parks which were mostly empty in the winter months. But, it also provided another public to be served with the limited park dollars available to public agencies. Although ski touring can be provided at a cost that is relatively low compared to other recreation activities, it does require large land areas and involves people with widely different expectations and requirements. These characteristics make it necessary to develop some systematic way of planning ski touring facilities in the context of different types of users and other demands on recreation resources. This paper describes the way this problem is being approached in the Regional Recreation Open Space System, which includes most of the large parks in the Seven-County Twin Cities Area.

The Regional System consists of about 60 large park and park reserve sites. About 50 of these sites are in the various stages of acquisition and development. Twenty-five provide some form of ski touring opportunity. They contain over 200 km. of designated trails and several areas which are open for casual skiing. The sites range in size from about 150 acres to nearly 5,000 acres and are, at present, scattered unevenly throughout the urban, suburban, and rural parts of the region. The Metropolitan Council is responsible for planning the System. The seven counties and four of the region's cities do the site planning, acquisition, development, operations and maintenance of each site. Acquisition and development comes through the Council from statewide bond proceeds according to a Council-prepared capital improvements program. Operations and maintenance are paid for by the individual counties and cities from their own revenue sources.

Planning and setting funding priorities for the multi-agency system requires comprehensive information on recreation interests, preferences and visitor characteristics. To obtain this information the Council conducted a series of on-site visitor surveys at a variety of facilities in the Regional System. Ski touring facilities were included, as were downhill ski areas, water accesses, picnic-swimming areas, nature centers, etc. Over 900 ski tourers were interviewed at 25 sites during the period December 1977 - March 1978. In addition, the Council assisted the Minnesota Department of Natural Resources in collcecting information on the overall recreation participation and desires of the region. The on-site survey data and general population participation information reported here and in other reports formed the bases for the Council's efforts in planning ski touring opportunities in the Regional System.

Skier Survey Results

Tables 1 and 2 give the more interesting and useful pieces of information from the skier survey. One of the difficulties involved in analyzing the data involves the wide variety of facilities that were surveyed. For comparative purposes, the data has been arranged by general location of the facility--urban, urbanizing, and rural areas. Although the classification roughly corresponds to the general planning areas used by the Council in all its programs, it is primarily based on such characteristics as site size, surrounding land use, and trail characteristics . One cannot approach the discussion of any recreation facility from the viewpoint that all areas are the same. This three-way classification serves to highlight the differences that exist between users of ski touring facilities.

Skier Characteristics

1. Length of Stay - As the facility becomes more rural in nature, the skiers tend

to stay longer. This is a reflection of the longer trips necessary to reach the rural areas and the relatively longer trail systems at the rural parks. This relation is generally true of all recreation facilities, but it is not as striking a difference in ski touring as in other facilities.

2. Group Size - Although the difference is not substantial, urban areas are used by slightly smaller groups. This is due to the larger number of single skiers out for the shorter trips typical of urban facilities.

3. Skill Level - Skiers were asked to rate themselves on a five-point scale of beginner to expert. The average skier ability appears to be slightly higher at the more rural areas. In general, the rural and urbanizing facilities are a bit more challenging than those in the urban area.

4. Skiing Experience - Skiers at the more rural areas indicated they had been skiing for more years. Figure 1 shows that the trend in ski touring in the region really began to pick up around 1971 and has continued at a steady rate, with one slight reversal in a bad snow year.

5. Occupation - The most interesting thing about occupation types is that they do not vary all that much across the three types of areas. The general description of a ski tourer as a professional/technical person holds across all areas, except that there tends to be a smaller proportion of professionals and more students at the urban areas.

6. Household Income - Median income is lower at the urban areas, but not by much. Some individual urban sites attract a lower income population. However, the gap between population median income and the generally higher skier median income is usually wider in the urban area.

7. Age - Young adults always dominate, but the dominance is stronger in the urban areas. There is a correspondingly lower percentage of teens. It seems the teenage skiers are not doing the short, close-to-home type of skiing that is typical of the young adults in the urban areas.

8. Distance Travelled - People obviously have to travel farther to reach the rural areas. However, the fact that the urban median is so low indicates that a very small proportion of the skiers who live in the rural and urbanizing areas are coming to the urban areas to ski. This is true of most recreation facilities, but not to this degree. The ratio of rural to urban medians is almost four for ski touring. Most other activities have a ratio of just over three.

The picture that emerges from this brief presentation is that Twin Cities area ski tourers, as reflected in the Regional Park System, are young professional or technical people with incomes above the regional median. They are relatively new to the activity. Some minor variation occurs, but the picture is more one of uniformity, at least according to the classification system used here.

Skier Preferences

Skiers were asked which characteristics of a ski area added to their satisfaction with their ski outing and which ones lessened that satisfaction. It was an open-ended question. The responses in Table 2 are grouped by general response type. The three top satisfaction increasers were good snow conditions, natural amenities, and trail layout/design. It is interesting to note that trail layout and design shows up more often for the more urban parks, since the trails are a bit more consciously designed or laid out in the more rural areas. The urban areas also hold their own in the amount of positive response to natural amenities. This is probably due to two things. First, the definition of good and poor natural amenities differs between skiers and, second, the trails in the urban area are mostly in very high quality resource areas.

When one looks at the things that decrease skier satisfaction, poor trail maintenance and support facilities join snow conditions and trail layout as important items. There is no mention of uninteresting natural amenities as an item that decreases satisfaction. Most of the sites have good amenity values. Another interesting item is that "lack of crowds" shows up as a positive item but "crowded" does not appear as a dissatisfying item. It appears that skiers are either choosing areas that they perceive as uncrowded or are expecting crowds at certain sites. Even the most urban of the sites had little, if any, comment about crowding.

The items that influence choice of areas also give some useful information for trail system planning. Convenience is the most important item. Both rural and urban sites have roughly the same proportion of skiers responding with this item. What is even more interesting is that when the responses at rural sites are further evaluated, there is little correlation between the answers of "close" or "convenient" and actual distances between the skiers' homes and the sites. The important point here is that convenience must be related to the type of experience or facility that is being provided.

The skier at a rural site may feel the site is close relative to other areas where he or she can get the desired experience. This is one of the main reasons why skiing in the Regional System has to be considered from at least an urban-rural perspective. Each must receive equal priority. Ski touring was the first activity to reveal this split--other recreation activities have since shown it to a lesser degree.

Constraints on Frequency of Skiing

Skiers were asked whether they were able to ski as often as they would like. About 40 percent said yes with a slightly larger percentage at rural areas. Of those that would like to ski more, other interests or responsibilities were seen as the dominant constraints. Lack of equipment and areas to ski were cited by about 10 percent with lack of areas and short hours being more of a problem to those who ski rural sites.

Overall, the data presented here portrays the Twin Cities skier as one who desires an interesting natural environment and good trail layout as basic prerequisites to the enjoyment of skiing. When these conditions are met, the skier will choose areas based on convenience and a level of crowding that is acceptable. The ski tourer appears to be a bit more discerning in picking sites than recreationists using other types of facilities.

Planning Ski Touring in the Regional System

The regional system is aimed at providing relatively equal service to metropolitan area residents for seven basic recreation activity types: picnicking, swimming, boating, fishing, camping, trails and resource interpretation. Some of these activity types must be analyzed in several parts--ski touring trails are part of the overall trails analysis. The system is being planned so as to locate regional sites where they will be able to relieve deficiencies for these seven facility types. Where there is a deficiency for several types in the same area, a Regional System unit will be selected so as to relieve this deficiency, if possible. If no site can be found to take care of all of the deficiencies, a site that can relieve most of them will be chosen. The important point is that the areas with several facility deficiencies or a few particularly severe deficiencies will have a high priority for new regional sites or facilities. Areas with less serious deficencies will receive lower priority for new sites and facilities.

This approach requires that the planner know what people want from a particular activity and how many of them will use a facility that is provided for it. The data concerning preferences and skier characteristics is valuable in determining the different kinds of experiences that are necessary within a given activity. In some cases complex formulas have been developed to predict how many people will be served by facilities of given characteristics, locations, and types. However, this approach was taken only where sufficient data was available. This was not the case with ski touring. Instead, two general types of ski areas were seen as necessary to the system--an urban type and a rural type. All existing Regional System units were classified as to type. Characteristics of the sites and their skiers as well as the amount of use they currently get were used to roughly estimate the number of skiers that use the sites of each type and where they come from. This usage was then adjusted for the subjective factors of quality, capacity, and non-regional opportunities so as to show the relative amount of service that the existing system provides to the various parts of the Twin Cities area. Where the pattern of existing sites provides little service relative to the rest of the region, a deficiency was said to exist. Where the pattern of existing sites provides much service relative to the rest of the region, an over-supply was said to exist.

In the Twin Cities metropolitan area, the following areas appear to be relatively undersupplied with ski touring opportunities at present:

1. Urban ski touring areas:
   - northern Dakota County
   - northeastern suburbs of Minneapolis
   - northeast Minneapolis
   - southern Anoka and northwest Ramsey Counties
2. Rural ski touring areas:
   - all of Ramsey County
   - southwestern Minneapolis

When the analysis assumed the Council's population forecasts for the year 2000 (the current planning horizon) and full development of all existing sites in the system, the deficiency areas were as follows:

1. Urban ski touring areas:
   - northeast Minneapolis
   - southern Anoka County
2. Rural ski touring areas:
   - southeastern Minneapolis
   - all of St. Paul

The deficiencies in these areas await completion of analyses from the other activities provided

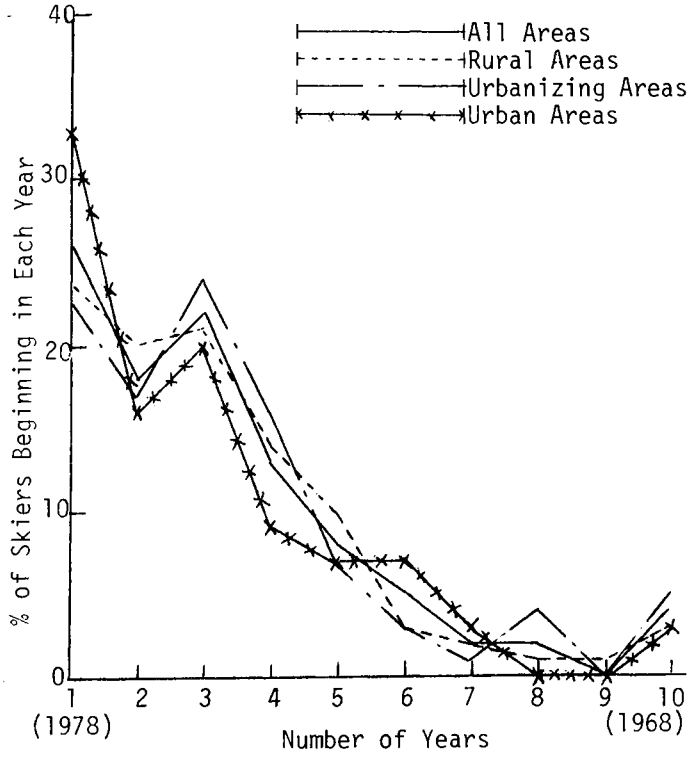
TABLE 1

SKIER CHARACTERISTICS

(by location of ski area)

Characteristic	All Areas (n=904)	Rural Areas (n=325)	Urbanizing Areas (n=345)	Urban Areas (n=234)
Median Length of Stay (minutes)	95	105	100	75
Median Group Size	2.0	2.1	2.1	1.8
Median Skill Level	2.8	2.9	2.8	2.6
Median Skiing Experience (years)	2.8	2.8	2.9	2.5
Predominant Occupations (% in each)				
- Professional	48	49	51	43
- Technical	9	9	8	8
- Student	11	9	14	18
- Homemaker	9	10	10	7
- Other	23	23	17	24
Median Household Income (1,000s)	19.8	19.8	21.1	18.1
Predominant Age Classes (% in each)				
- Teen	38	39	43	29
- Young Adult	49	48	44	58
- Middle Age	9	10	9	7
- Other	4	3	4	6
Median Distrance Travelled (miles)	9.3	14.2	8.4	3.7

FIGURE 1 - SKIER EXPERIENCE



by the Regional System. When these are completed a general picture will develop depicting those areas where relative deficiencies exist for several facilities. New sites will be selected on the basis of how well they satisfy these deficiencies. Specific planning will then be done to ensure that the new sites are acquired and all sites developed so as to relieve the specific deficiencies they have been established to meet.

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TABLE 2

SKIER PREFERENCES, CONSTRAINTS

(by location of ski area)

Elements:	Percent Responding with Each Element at: All Areas (n=904)	Rural Areas (n=325)	Urbanizing Areas (n=345)	Urban Areas (n=234)
1. That increase skier satisfaction:				
- good snow conditions	31	27	31	38
- interesting natural amenities	30	27	34	28
- good trail layout, design	30	27	26	39
- lack of crowds	21	23	17	26
- good support facilities	18	21	18	13
- good trail maintenance	16	20	15	10
- other specific items	16	11	13	26
2. That decrease skier satisfaction:				
- poor trail maintenance	16	19	15	13
- poor snow conditions	15	21	9	15
- poor trail layout, design	14	17	12	12
- no/poor support facilities	13	14	13	10
- restrictive rules, regulations	7	6	8	7
- other specific items	4	3	7	4
3. That influence choice of areas:				
- convenience	45	38	56	38
- others' opinions, decisions	11	13	9	13
- trail layout, design	8	8	7	9
- curiosity, new areas	7	11	7	4
- familiarity	5	5	6	5
- natural amenities	3	3	4	1
- other specific items	10	17	7	5
4. That serve as constraints to skiers:				
- no constraints (1)	43	48	39	42
- other interests, responsibilities	32	21	37	40
- lack of equipment	9	10	7	9
- too few ski areas	9	12	6	8
- hours areas are open	6	9	4	6
- fees charged at areas	4	2	5	4
- lack of transportation	4	2	5	5

(1) When asked if they skied about as often as they would like, this percentage of skiers responded "yes."

FACTORS INFLUENCING THE PROBABILITY AND FREQUENCY OF PARTICIPATION IN CROSS-COUNTRY SKIING BY NORTHEASTERN HOUSEHOLDS

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Cross-country skiing is becoming a popular winter recreation activity to such an extent that a growing number of commercial and public cross-country ski trails are being planned and constructed.[1] The purpose of this paper is to present a Northeastern cross-country demand projection taking into consideration variables that are likely to influence changes in the growth trend.

While cross-country skiing can be done freely on many types of forested and open land areas, an increase in participants is beginning to have a noticeable impact on recreation markets and natural resource areas. However, the dispersed and rather unstructured nature of the activity makes it difficult to predict exactly how and where future growth of cross-country skiing will take place. Nevertheless, public agencies and commercial recreation managers need information on the cross-country skiing growth potential in order to plan and to use resources wisely.

In making the projection of cross-country skiing demand, it was necessary to focus on specific questions regarding the factors involved. For example, would an older population participate in skiing at a lesser rate? Are smaller families more likely to participate in skiing than larger families ? Would an increase in women wage-earners and its consequential rise in per capita income lead to greater participation in skiing? What effect would a "slow down" in population growth have on the skiing participation?

DATA SOURCES AND PROCEDURE

Data for this study were obtained from the 1976 Northeast Recreational Lodging Survey which included information on participation in outdoor recreation activities as well as on use of recreational lodging. Details of the survey are reported in an economic analysis of the recreational lodging market [4].

Data from the survey were used to estimate demand equations for cross-country skiing by using a two-stage procedure.[1] The first stage measured the relation between the probability of a household participating in the activity and a set of explanatory variables. The second measured the relation between a household's frequency of participation and a set of explanatory variables.

Next, the 1976 average values of the explanatory variables were applied to the equations to establish a benchmark situation. Finally, projections were made by applying anticipated 1982 values of the explanatory variables to the equations to obtain an estimate of the 1982 level of cross-country skiing participation.

FACTORS SELECTED AND DESCRIPTION OF SKIERS

A list of the socio-econonic factors selected as having potential influence on cross-country skiing participation is presented in Table 1. Basically, the factors represent age, income, family size, and time spent in outdoor recreation.[2]

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* Scientific contribution No. 796, Storrs (Conn.) Agricultural Experiment Station. This report is based on research conducted under Northeast Regional Project NE-100.

1 Cross-country skiing had the highest adoption rate in 1977 according to a NE-100 Regional Report [2].

1 For a discussion of the rationale for a two-stage demand estimation procedure see Cichetti, Seneca and Davidson [1, pp. 78-86]. For examples of other studies using the two-stage procedure see Gould and Kottke [3] and Sim and Kottke [6].

2 The words "factors" and "explanatory variables" are used interchangeably in this report.

Table 1. Socioeconomic Characteristics of Household Respondents by Types of Skiing Activity, Northeast Region, 1976.

Socioeconomic Factors[a]	Type of Household Respondent: Downhill Skier	Cross-country Skier	All
	(Mean Values)		
Age (Years)	33.1	40.8	47.9
Per Capita Income ($)	10,076	9,891	7,671
Family Size (No. of Persons)	2.48	2.31	2.83
Vacation Days (No. per Year)	23	30	31
Time Spent in Outdoor Recreation (Hours per Year)	358	542	208
Home-Based Recreation (Days per Year)	56	133	63

[a] All mean values pertain to the household or household head as appropriate.

Northeastern cross-country skier households are apparently different from the average household with respect to the socio-economic factors selected for study. Compared with all households, skier households: (1) Were younger. (2) Had higher incomes. (3) Had smaller-sized families. (4) Had about the same number of vacation days. (5) Spent more time in outdoor recreation. (6) Spent more time in home-based recreation. It is also interesting to see that cross-country skier households differed from downhill skier households. In general, cross-country skier households fell in between the other two groups in terms of age, income, family size and vacation days.

These differences among the three groups suggested that the selected factors may have had a bearing on whether or not (and if so, how often) a person participated in cross-country skiing. With that suggestion as a beginning, the next step was to analyze the factors for direction and magnitude of influence.

DEMAND ESTIMATION

Probability of Participation

The decision on whether or not to participate in cross-country skiing was hypothesized to depend on four variables, namely, age, composite recreation time, per capita income and home-based recreation time. An equation was formulated as follows:

$$Pr = f\ (A,R,B,PY) \qquad (1)$$

where

Pr = probability of households participating in cross-country skiing
A = age of household head (years)
R = time spent on a composite of outdoor recreation activities by a household member (hours per year)
B = time spent in home-based recreation (days per year)
PY = per capita income ($ per year).

Results of applying a least squares regression analysis were as follows:

$$Pr = .0312 - \underset{(.4)}{.000139}\ A + \underset{(5.5*)}{.00139}\ R + \underset{(4.7*)}{.00035}\ B + \underset{(2.1**)}{.00000196}\ PY \qquad (2)$$

As seen by the signs of the coefficients, age had a negative influence while the other 3 variables had a positive influence.[1] It is particularly interesting to note the positive influence of home-based recreation time. A family's opportunity for and interest in home-based recreation apparently plays an important role in determining whether a family participates in cross-country skiing. One of the advantages of cross-country skiing is that it can usually be done around one's home (backyard, local park, golf course, open field, etc.).

Frequency of Participation in Cross-Country Skiing

The frequency relation was formulated as follows:

$$D = f\ (A,R,F,V,PY) \qquad (3)$$

where

D = days of cross-country skiing per year by a skier
A,R,PY = same as in Equation 1 except that the data pertain only to cross-country skier households, not all households
F = family size of cross-country skier households (number of persons)
V = vacation days per year available to a cross-country skier household.

Application of a least square regression analysis gave the following results:

$$D = 22.1888 - \underset{(2.4**)}{.5522}\ A + \underset{(.9)}{.0098}\ R + \underset{(.3)}{1.0958}\ F + \underset{(.5)}{.0664}\ V + \underset{(.8)}{.000586}\ PY \qquad (4)$$

1 Numbers given in parenthesis in Equations 2 and 4 are t values. * = significant assuming a .01 probability of error. ** = significant assuming a .05 probability of error.

Just as in the probability equation, age had a negative influence on frequency of participation. It may be that cross-country skiing is quite demanding physically and, therefore, was done less often by older people. Another possible explanation is that because of the relative newness of the activity, benefits of long experience had probably not yet begun to show up among the 1976 NRLS respondents.

All of the other explanatory variables showed a positive influence, but were not statistically significant. Thus, variation in frequency of cross-country skiing has an elusive explanation. Obviously, frequency of skiing depends ultimately upon the amount and frequency of snowfall, but such a condition would presumably influence all households equally. In other words, variations in snowfall from year to year may influence frequency of participation in the aggregate for all households, but would not account for differences among households.

Given the foregoing considerations, it was concluded that the estimating equation for probability of participation was fairly reliable and, although the estimating equation for frequency of skiing gave an incomplete explanation of variability, the results were reasonably sufficient for projection purposes, subject to the aforementioned qualifications.

PROJECTION OF DEMAND

What effect would the combined changes in age composition, income, vacation time and composite recreation time have on regional skiing participation levels over a 5 year period? What would the "net effect" be from a slowdown in population growth in conjunction with the foregoing changes?

Changes in the Economy

Some of the recent and current changes in the economy have predictive value for the near future. Those changes which are relevant to this study are as follows:

1. A declining birthrate, which became significant in 1965 and has lasted 12 years, may mean less emphasis on a "youth culture" in the 80's. With a significant change in age composition, the mean age of the population may be expected to increase. Moreover, persons born in the post-WWII baby boom are now beginning to enter the family formation stage which for many, especially young parents, may mean a respite in skiing participation.

2. Personal disposable income continues to increase and employment levels are at an all time high. As more and more women enter the work force, household incomes increase substantially and per capita income may be expected to increase substantially. This means that consumer spending power continues growing stronger.

3. With a declining birth rate, fewer marriages and more divorces, family size is becoming smaller. Single persons will have an important influence on consumer and recreation markets in the future.

4. Worker's demands for more fringe benefits will likely result in more and longer paid vacations. An economic and political climate of uncertainty leads to preferences for guaranteed annual wages and vacations. Therefore, vacations may be expected to become longer.

5. Time spent in outdoor recreation is gradually increasing as people learn more about opportunities to participate in winter activities as well as summer activities.

6. Emphasis on home-based recreation may increase as long as the energy crisis continues.

7. Population growth in the Northeast region has leveled-off with some states declining and some growing. Movement away from urban areas to rural areas is shifting the sources of demand for recreation markets.

Changes in the economy, as noted above are reflected in the mean values of the explanatory variables for 1976 and 1982 as shown in Table 2. For example, mean age would increase 3 percent; per capita income would increase 12 percent; family size would decrease 6 percent and vacation days would increase 6 percent. By using the demand equation approach it is possible to obtain a "net effect" of the combined set of changes.

Results of the Demand Projection

According to the results of the analysis, cross-country skiing would expand 17.1 percent between 1976 and 1982 (Table 3). While frequency of participation would increase less than 1 percent, probability of participation would increase 15.3 percent.

Most of the increase in aggregate participation would come from growth in number of participants rather than from greater frequency. Rising incomes and greater time spent on home-based recreation would be the major contributing factors, while an aging population would be a restricting factor.

Table 2. Structural Data and Mean Values of the Explanatory Variables, Northeast Region, 1976 and Projected 1982.

Item[a]	Benchmark 1976	Projected 1982	Percent Change 1976-82
Total Households (000)	19,207	20,550	7
Total Population (000)	56,000	56,560	1
Age (Years)	40.8	42.0	3
Per Capita Income ($)	9,891	11,078	12
Family Size (No. of Persons)	2.31	2.17	-6
Vacation Days (No. per Year)	29.78	31.57	6
Time Spent in Outdoor Recreation (Hours per Year)	542	553	2
Home-Based Recreation (Days per Year)	133	140	5

[a] All mean values pertain to the household or househead as appropriate. Only the means for cross-country skier households are presented here, but the means for all households were used for calculating the projected probability of participation.

These results for cross-country skiing seem reasonable from the standpoint that the activity only recently began being widely adopted in the Northeast region. Compared to downhill skiing it still has a "lot of room" to grow. Should the 17 percent increase in demand occur, regional aggregate participation in cross-country skiing will still only be about 60 percent as large as that for downhill skiing (13.1 million vs. 21.6 million skier-days).[1]

[1] Further details on downhill skiing demand are forthcoming in a report by the author [5].

Table 3. Estimated Change in Cross-Country Skiing Participation by Northeastern Households Between 1976 and Projected 1982.

Item	Benchmark 1976	Projected 1982	Percent Change 1976-82
Probability of Participating	.0281	.0324	15.3
Households Participating (000)	540	666	23.3
Frequency of Participation (Average Days per Year)[a]	12.00	12.08	.7
Individuals Participating (000)[b]	934	1,086	16.3
Regional Total Participation by Individuals (000 Skier-Days)	11,208	13,119	17.1

[a] The average value shown here is the mode.

[b] The number of skiers per household was estimated to be 75 percent of the members of a household.

CONCLUSIONS

Although population growth in the Northeast may be slowing down, participation in cross-country skiing is likely to continue expanding into the 1980's. While the frequency of participation may not change much, the number of participants may be expected to grow. Factors that may influence changes in the numbers of participants are (1) age composition of the population, (2) total time spent on recreation, (3) time spent on home-based recreation and (4) per capita income. Of these only age is negatively related to probability of participation. If home-based recreation increases as projected in this analysis, then cross-country skiing is likely to continue becoming more popular. A continuation of the energy shortage probably would not dampen the level of cross-country skiing participation, particularly in those states of the Northeast that experience an adequate amount of snowfall.

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CROSS-COUNTRY SKIERS: ARE THEY REALLY DIFFERENT?

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In the face of rapidly changing energy and societal pressures, unprecedented numbers of people are seeking relief in the form of outdoor recreation. These changing pressures are also demanding an alteration in the forms and patterns of recreation experiences. The traditional summer vacation is being replaced and/or complemented by shorter more frequent excursions into a broader spectrum of recreation activities, particularly those which generally occur in non-traditional recreation periods.

One activity which stands out as a natural result of these pressures is non-competition cross-country skiing. Reporting on the soon-to-be released Nationwide Outdoor Recreation Plan, Joanne Fishman noted that "... while all recreation will grow substantially, snow-based activities will grow the fastest... Cross-country skiing tops the list as the fastest-growing activity..."(1). There is a need for data on who the participants are and what are their needs. Are these skiers really different as some have suggested? Or, are they simply recreation traditionalists who have discovered an in vogue activity which has a sufficiently diverse participation format to satisfy a broad array of user "needs"?

THE CROSS-COUNTRY SKIER IMAGE

Perhaps a way to analyze the cross-country skier is to look at the image that is popularly held. Although there is little hard data on perceived imagery as a determinant of decision-making, recent research carries some very strong implications that prospective and active participants influence their behavior by the images they hold of themselves in a particular activity.

A generalized image of the cross-country skier, which has been gleaned from implied research findings and from pages of popular trade magazines, suggests that this skier is quite unlike his downhill contemporary. This skier is neither a macho-man nor a liberated women; for this image does not favor a stylized sex anymore than it does a skiing technique. Rather, it favors the individual in nature. It is for all, male and female, young and old, rich and poor... as long as the individual exudes wholesomeness. Although the cross-country skier is gregarious, he skis in small groups, preferably with family and friends. But the popular image of the cross-country skier still connotes that of a loner, sensitive to the environment and prosessing at will an entire wilderness (6).

Americans traditionally have loved the image of freedom, particularly that associated with unfettered use of natural environments. They also love the image of youth and the cross-country skier projects an image of both, especially that of freedom. Unlike the youthful downhill skier, the cross-country skier's environment is not cluttered by lift lines nor limited to mountains nor staged resorts. The image is free of fashion parades (for the moment) as well as costly downhill skiing expenses. This image is not wedded to mountains making him a slave to the jet, the train, nor the automobile. He skis wherever he chooses... up as well as down.

The main element of discord that threatens this freedom lover is the snowmobiler carrying with him the image of noise, pollution, mechanical destruction, and the crude bully of field and forest. The conflicts between a cross-country skier and a snowmobiler create a scenario of a wolf pack chasing a lone deer... a colorful image of an underdog. Perhaps it is this underdog image that makes cross-country skiing so appealing to Americans -- for Americans love underdogs as much as they do freedom and youth (6).

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In examining the image further there seems to be not a single image but rather a three-element image based upon principal motivations. Perhaps these motivations may simply be attempts to fulfill the desired image. Since our attention at this point is directed at IMAGES and not motivations the best way, or most convenient way to categorize these three groups, is through projecting visual impressions of the cross-country skiers. Rest assured, that although images are not cast in bronze they are deep rooted in the minds of the observer, even when he is not observing. For that reason, although images are gross generalizations of mental pictures, they are definitive.

The first image group is that of the group skier, i.e., those who buy $100 ski packages and go for short trips on weekends. Sometimes this skier is alone, however he is usually with the family and friends. The skier is clad in a potpourri of winter attire. They generally find waxing a giant bore and prefer the "easy, no-wax" models. This skier is friendly, good natured, unobtrusive and fairly well educated. Yet, take away the skis and the group image is non-descript. The best way to detect them is by their cliche expression of cross-country skill, "If you can walk you can cross-country ski."

The second image group is that of John Muir on skis. The long tour skier bears the image of the summer backpacker with the addition of old worn skis and "functional" clothing. The image of this wilderness buff is that of a skier clad in a tall truncated stocking cap, baggy wool knickers, down vest, a backpack, a 35 mm camera slung on his hip and that ever-present Sierra cup. If it's a man he will have a beard. If it's a woman her hair will be braided. Primarily they are college students and detest snowmobiles and hunters. The image is wooly, hairy, baggy and bulky.

And lastly, the third image group, is the cross-country skier. They are easily recognized on the white blanket of snow with their colorful skin-tight racing suits. Although cross-country skiers snub fashion, this group prefers coordinated tastes... a solid color suit with a racing stripe running down the side... and white socks seem to go well with everything. They are clean shaven but beards are accepted. They have more expensive equipment with unpronouncable Scandinavian names. They are not burdened with excessive paraphanalia when skiing, yet they are sure to have a rainbow of waxes. They are a few of those who understand why the Eskimos have more than twenty names for snow. Everything about this image is thin --- thin bodies, thin skis, thin ski suits and thin interests.

Regardless of the specific motivations or behavior of these separate groups this winter recreationist still connotes the solitary figure etching fine lines in the unbroken snow. This relatively new skier claims his style of skiing is not a technical sport but rather a vehicle for the individual to commune with nature. Or perhaps this is what the skier likes to believe his image projects. Whether his motivations is to commune with nature or to fulfill the desired image, the cross-country skier is uniquely different. But, what is he different from and in what ways?

The imageability power of cross-country skiing is as yet not fully understood. But the activity is one which must be studied, planned for and managed. The North American Symposium on Dispersed Winter Recreation is likely to serve as the springboard for new and imaginative research for discovering who and what is the cross-country skier.

CROSS-COUNTRY SKIER PROFILES

Research conducted in Maine over two winter seasons (1976-77 & 1977-78) produced data from over a thousand cross-country skiers throughout Maine. These data have provided the opportunity to compare the cross-country skier with other winter recreationists, particularly the downhill skier and the snowmobile user. There appears to be common motivational categories for these three winter activity groups, i.e., there are three major categories: 1. those related to health & excercise, 2. social interaction, and 3. nature and aesthetics. For the most part, social interaction is a common motivation of all three activities, however, it also appears to be a dominant motivation for the downhill skier. Expressed motivations of the cross-country skiers suggest that nature appreciation, aesthetics, and the pleasantness of the environment are most important. For the snowmobiler, nature and social interaction are frequently mentioned motivations but man/machine against the winter environment as a sports activity seems to dominate most user motivations.

As planners look at winter recreation motivations and resultant behavior, they soon discover some rather interesting profiles that seem to parallel the image discussed earlier. For instance, a somewhat simplistic profile of the downhill skier might read like the following (2):

- -the downhill skier is perceived as being young (under 30)
- -has skied over six years
- -has low to intermediate skill
- -considers downhill a family activity but skis mostly with friends
- -averages about 11 days of skiing per year on skiing vacation trips
- -takes at least one skiing vacation trip of at least 4 nights per year

-considers high costs, crowding, and lack of opportunity (time and facility proximity) as reasons for not skiing more often
-considers the downhill skiing environment as socially enjoyable

On the other hand, the cross-country skier profile might read like the following (3):
-median age of the cross-country skier is over 30 years
-has been skiing less than five years
-expresses a moderate degree of skill
-skis most frequently with family members, but often with friends who also taught him to ski
-averages about 13 days of skiing per year on skiing vacation trips
-has a median of two skiing vacation trips per year of at least four nights per trip
-takes frequent (8 to 10) short trips for cross-country skiing (less than 4 nights)
-prefers cross-country skiing over downhill because of high costs, "snobbish downhill environment," crowding, and better opportunities (timewise and location proximity)
-considers cross-country skiing as being close to nature as well as a pleasant winter activity.

It is possible to become quite finite in developing the profiles of these two skiing types, however, research in Maine has shown that basic motivations, resulting in the adoption of less definitive skier images, can often provide sufficient profile data to assist management decisions. If we look at a profile of the cross-country skier developed from median responses to a questionnaire, the profile might look like the following (judge for yourself whether or not this profile supports the image of the solitary skier etching fine lines in the snow):
-median age is 30 to 34
-skis approximately 20% more often on weekends than on weekdays
-usually skis with at least one other person
-skis about 15 weekdays and 12 weekend-days per year
-skis at an average three miles per hour
-trail preferences are 60% for groomed and marked trails; 28% for marked only; and 12% for neither groomed nor marked
-sustained injuries at a rate of 8 per 100 skiers
-median dollars spent on equipment equals $76 to $100
-median dollars spent for rentals equals $11 to $25
-after taking up cross-country skiing, 10% skied more downhill, 24% skied about the same, 63% skied less downhill, and 3% stopped downhill skiing
-fifty-seven percent of the cross-country skiers are male and 43% are female
-marital status is 38% single, 56% married, and 5% divorced
-median age of the youngest child at home is 12 years
-about 71% were introduced to cross-country skiing by family and/or friends.

Does this profile support the generalized image or does the profile need to be refined? If we select a couple of specific motivation groups for comparison to the generalized cross-country skier, the profile would look somewhat different in several rather interesting areas. For instance, the skier primarily motivated by adventure-seeking (third image group?) might have a profile as follows:
-usually under 24 years of age
-does more skiing on both weekdays and weekend days than other motivation groups, usually from 30 to 50% more
-skis from 60 to 70% further per hour than others
-has about double the incidence of injury compared to other groups
-has strong preference for marked and groomed trails
-three times more likely to be a single male
-is likely to place less emphasis on adventure-seeking as a motivation as he approaches 30 years of age
-most likely to have learned to ski at school on rented skis
-usually spends more money on equipment and rentals than other groups
-has not changed downhill skiing patterns as much as the average skier

By comparison, the skier who is primarily motivated by the desire for social interaction while skiing might assume the following profile (compare with image group one):
-age is in the mid- to late-thirties
-involves more members of the family in skiing outings
-divides his skiing equally between weekdays and weekends
-prefers light or medium encounters with skiers other than his group
-tends to dislike being on the trail without traffic
-less likely to continue any or as much downhill skiing after taking up cross-country skiing
-is likely to be married with two children under 12 years of age
-this group is about 58% male and 42% female
-will travel the least distance and ski the fewest days of all motivation groups
-tends to invest less money on equipment purchases and/or rentals
-compared with the adventure-seeking group, will reduce snowmobile activity only half-as-much but will reduce downhill skiing twice as much.

Motivations relating to adventure-seeking

and social-interaction are but two of eight categories which include exercise and health, nature appreciation, solitude and relaxation, pleasurable winter activity, socio-economic, and alternative winter activity. Each of these motivation categories produce a variation in the cross-country skier profile. More importantly, each has some areas of commonality and each seem to relate in varying degrees to one of the three image groups identified earlier in this paper.

As motivational differences begin to suggest the range of management alternatives that must be considered, it would be well to assess the differences and to determine whether there are any potential inter-group conflicts. Likewise, measures of compatibility with other winter recreation activities need exploring.

CROSS-COUNTRY SKIING COMPATIBILITIES

Much has been said about conflict among or between the various recreation activities and there remains the question of whether these conflicts are real or whether they are part of image role assumption accompanying the adoption of any recreation activity. If an individual adopts an activity, to what degree does he also adopt the prejudicial trappings attributed to that activity? Certainly, the positive components of most activity imagery are accepted but there is still concern that little is known of the tolerance and intolerance elements of an activity profile.

Taking the cross-country skier, data analysis has shown some rather interesting aspects of inter-activity compatibility and confirmed some imagery conflict situations. Research conducted by Skiing Magazine has suggested that complementing or off-season activities for the cross-country skier are very similar to those enjoyed by most other outdoor recreation enthusiasts (5). The most favored non-winter activities are swimming, tennis, bicycling, camping, and fishing. When we look at winter activities, the picture changes somewhat; cross-country skiers expressed a high degree of compatibility with ice-fishing, winter camping, and snowshoeing. In fact, they quite often participate in these activities as part of their total winter recreation repertoire. Three other activities, however, suggest quite a different picture.

Cross-country skier compatibility with activities such as downhill skiing, snowmobiling, and hunting takes on a posture of apparent inconsistency. For example, although nearly 60% of the cross-country skiers continue to participate in downhill skiing (at a somewhat reduced frequency), they do not favor mixing the experiences but will tolerate a moderate frequency of encounter with the downhill skier. Encounters with hunters and snowmobilers are almost totally intolerable, even though the cross-country skier may actually engage in these activities himself on a somewhat limited basis (1 out of 5 participate). It would appear that snowmobiling and hunting are recognized as valid activities but should never be mixed with cross-country skiing and apparently the reverse may also be true.

Inter-activity compatibility research is needed to assess the degree to which different activities might occur within the same proximate management area. It is the contention of the authors that compatibility measures can best be studied by looking at comparisons between specific recreation experience characteristics and the various user behavior profiles. Such comparisons should isolate those concerns for which specific management solutions might be needed. The profiles should be of particular value when dealing with those participants who are involved at different times in the seemingly incompatible activities.

SUMMARY AND CONCLUSIONS

The cross-country skier is different and because of the specific differences, it will become increasingly important to understand just how to deal with these differences. Variability is not restricted to comparisons with other winter recreation activities; intra-activity differences exist and can be sufficiently defined to be of assistance in management decision-making. If winter recreation planners and managers are desirous of being responsive to the needs of the various motivation categories and image groups of cross-country skiers, then they might well consider the dynamics of skier profiles. These profiles are likely to coincide with the imagery and myths of cross-country skiing. This should not be viewed as a problem but rather as an opportunity to assess the disparities between action and perception.

During the next three to five year planning period, cross-country skiing will become a major force on the winter recreation scene; research data supports this contention and world situations, particularly energy, almost dictate a shift to those activities capable of being offered close to home. New demands will be placed on old resources such as golf courses, city parks, arboreta, nature study areas, demonstration forests, etc. as demands rise for recreational outlets during the winter months. Increased leisure time and altered vacation periods will create new and greater demands for opportunities such as cross-country skiing, particularly as schools start closing in the coldest winter months or meeting for longer periods each day in order to close schools for three to four days per week. The pressures will build but will resource planners and managers be prepared to respond -- not if we don't learn

more about our users, and available resource to satisfy some rather sepcific demand.

The cross-country skier is different and these differences can be assessed, planned for, and managed to improve the quality of experience for all skier types. Population data and national skiing surveys are providing the framework for solution and the guidelines for specific management actions will likely be developed through study of skier profiles based on motivation, behavior, attitude, imagery, myths, and social/psychological need. Planned research will be focused on the refinement of techniques for developing profile data which can then be analyzed against activity images. The evolution and perhaps the pollution or corruption of these images can be assessed, modified, and used as tools by the planner and manager in reducing unresponsiveness, misplaced investments, and unwarranted competition among management alternatives.

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SKIING ENVIRONMENTS PREFERRED BY COLORADO SKI-TOURERS

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BACKGROUND AND PURPOSE OF PAPER

Ski touring in the Colorado Rockies has increased greatly in the past decade. A survey by Rosenthal (1977) and updated by Rauhauser (1979) found that, between 1968 and 1979, the inventory of rental cross-country skis in Boulder, Colorado increased at an average annual compounded rate of 25%.

This increase in the popularity of the sport similarly increases the responsibility of recreation managers to provide skiers with high quality recreation experiences, to protect them from serious harm, and to prevent unacceptable damage to the resource (Driver and Brown 1978).

To do their jobs better, managers of ski-touring areas need information about the types of people who ski and what characteristics they desire in a ski-touring area. Research has shown that managers' perceptions of users' preferences and the users' actual preferences often differ (Hendee and Harris 1970, Clark et al. 1971).

This paper summarizes the findings of two surveys conducted during the winters of 1976-77 and 1977-78 along the Front Range of the Colorado Rockies. Information is presented concerning (1) the characteristics of the users, (2) their preferences towards selected features of the ski-touring environment (physical and social attributes are considered), and (3) skier opinions towards 18 possible management actions.

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DESCRIPTION OF STUDIES

Study 1 (Rosenthal 1977) was conducted during the winter of 1976-77, at the East Portal and Brainard Lake ski-touring areas west of Boulder, Colorado. Skiing difficulty and terrain vary at these 9,000- to 11,000-foot elevation areas. People in the parking lot were asked randomly to fill out a questionnaire. A total of 556 questionnaires were collected with a response rate of 92%. Study 2 (Rauhauser 1979), which was done during the winter of 1977-78 at nine ski-touring sites along a 100-mile section of the Front Range of the Rockies in Colorado and Wyoming, used similar methods to collect data. A total of 1,007 completed questionnaires were received with a response rate of 86%.

CHARACTERISTICS OF SKIERS

Important characteristics of the skiers in both studies are summarized below:

1. Approximately 60% of the skiers were male.
2. Approximately 70% of the skiers were in the 21- to 35-year-old age bracket.
3. More than 67% of the skiers had completed 4 or more years of college.
4. In Studies 1 and 2, 30% and 37% of the skiers, respectively, indicated that it was their first year skiing.
5. The average number of years skied in Study 2 was 3.2.
6. In Studies 1 and 2, the percentage of skiers classifying themselves as beginner, intermediate, and expert skiers was 39%, 51%, 10%, and 32%, 50%, and 18%, respectively.
7. The average distance skied in each study was about 5 miles.
8. Study 2 found the average trip lasted 5 1/2 hours.

The most striking characteristic listed above is that 67% of the persons contacted had completed 4 or more years of college; 38% did some post-graduate work. This is well above the 1977 national norm, when 15.4% of the U.S. adult population had completed college (U.S. Bureau of the Census 1978). The skiers in these studies were better educated than the general public.

SKIER OPINIONS ABOUT CHARACTERISTICS OF THE SKI-TOURING ENVIRONMENT

Preferences for Physical and Social Settings

Study 2 asked respondents to rate, on a 9-point scale, how much selected features of the physical and social setting would either add to or detract from their level of satisfaction. Where appropriate, individual questionnaire items were grouped into scales by use of a hierarchical clustering program developed by Revelle (1979). The mean scores on the questionnaire items and scales are shown in Table 1.

Views of natural areas and trails through natural areas were the two most highly valued features. This agrees with previous research findings that experiencing nature is one of the most important reasons why people participate in various forms of dispersed outdoor recreation activities (Driver 1975, Driver and Knopf 1976, Brown and Haas 1979[2], Haas et al. 1979).

Table 1 also shows that snowmobiles were disliked most. Skiers felt that the presence of a few snowmobilers was almost as bad as the presence of "more than a few snowmobiles." It is almost as if an all or nothing effect occurs. Statistical tests were conducted to see if opinions about the listed attributes were related to the characteristics of the skiers.[3] Generally, opinions were not related to skier characteristics, but two relationships worth noting were discovered.

The following types of skiers were more apt to favor development of the area: older skiers, beginner skiers, and skiers who stayed on the trail (11% of variance in development of area explained by these 3 variables). Also, the data show that expert skiers were more apt to favor steep sections of the trail than intermediates, who were more apt to favor them than beginners (14% of variance explained by ability).

Skiers' Attitudes towards Encountering Other Skiers

Table 1 shows that skiers react negatively to the idea of encountering "more than a few other skiers." In contrast, encountering only a "few other skiers" was not perceived negatively.

As a part of Study 1, skiers were asked if other people reduced their satisfaction at all during that day's trip. To determine how much use the areas were getting, a count of the number of cars in the parking lot was kept for each interview day. By combining the car count with information about the average number of people per car and the number of miles of trail at the area, an index called people per trail mile (PPTM) was computed. That index represents the number of skiers per mile of trail during the peak time of usage (i.e., 1:30 p.m.) on the interview day. With the PPTM index, the skiers responses to the survey could be related to an objectively measured index of density of use.

Table 2 shows an inverse relationship between density of use and the measured component of skier satisfaction. As the PPTM increased, a greater percentage of the respondents felt other people reduced their satisfaction. How representative those figures are of other types of settings and geographical areas is not known. Stankey (1973) also reported a similar relationship between the number of encounters with other users and satisfaction.

Other researchers, however, have failed to find a clear relationship between satisfaction and density of use (Nielsen and Shelby 1977, Heberlein 1977). The way user satisfaction is measured is crucial to the outcome of these types of studies. For example, if recreationists are asked if other people bothered them, they are apt to say "yes" if the density of use is high. However, if they are asked how satisfied they were with their outing in general, it is doubtful that their answers will be related to density of use unless the situation is extreme. The concept of satisfaction in recreation is discussed in detail by Dorfman (1979).

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[2] Brown, Perry J., and Glenn Haas. 1979. Psychological outcomes and physical resource attributes of the environment - the Flat Tops case. Prog. Rep. 16-646-CA, U. S. For. Serv., Rocky Mt. For. and Range Exp. Stn., Fort Collins, Colo. [Cooperative Agreement with Colo. State Univ.]

[3] Characteristics tested were perceived skiing ability, years skied, age, hours skied on day interviewed, distance skied, size of group, education level, sex, site skied, size of home town, whether or not respondent had children, and whether or not they skied off the trail.

Table 1. Skiers' Preferences for Selected Physical and Social Attributes of Areas in Study 2 (N = 950)

Attribute Questionnaire Item(s)	Mean[a]	Standard deviation	Reliability[b]
Views of Natural Scenes	8.2	0.9	.87
Views of stream valleys	8.1	1.1	
Views of mountains	8.4	0.9	
Views of lakes	8.1	1.2	
Trails through Natural Areas	7.5	1.2	.74
Trails following streams	7.1	1.6	
Trails going through forests	7.9	1.3	
Trails going across meadows	7.4	1.6	
Trail Sections with Moderate Slope Trail sections where no effort is required to keep moving	7.3	1.6	na
Old Structures	6.7	1.5	.69
Old mining sites	6.6	1.9	
Old abandoned cabins in area	6.8	1.6	
Shelters	6.7	1.8	.68
Overnight hut system	7.0	2.0	
3-sided windbreak shelters located along trail	6.4	2.1	
A few other Skiers Presence of a few other skiers	5.8	1.7	na
Development of Area	5.8	1.5	.67
Parking lots	5.6	2.2	
Trailhead registration	5.2	2.1	
Mileage markers along trail	6.1	2.2	
Outhouses at trailhead	6.2	2.2	
Trail Sections with Steep Slope Trail sections where hard braking or sharp turns are necessary to control speed	5.7	2.3	na
Snow Control Structures Snow accumulation fences along portion of trail	5.2	1.9	na
Modern Structures Contemporary wooden cabins in area	4.8	2.4	na
Dogs Dogs on trail	4.1	2.4	na
Many other Skiers Presence of more than a few other skiers	3.8	1.7	na
Views of Roads and Cities	2.7	1.7	.78
Distant views of urban areas	2.9	2.0	
Distant views of cars on road	2.5	1.6	
Snowmobiles	1.7	1.1	.79
Presence of a few snowmobiles	1.8	1.6	
Presence of more than a few snowmobiles	1.3	1.0	
Snowmobile tracks on snow	2.2	1.7	
Noise of snowmobiles	1.5	1.2	

[a]Respondents were asked how much the above features would add to or detract from the satisfaction they would receive from their skiing trip. Responses were coded (1) most strongly detracts, (2) strongly detracts, (3) moderately detracts, (4) slightly detracts, (5) neutral, (6) slightly adds, (7) moderately adds, (8) strongly adds, and (9) most strongly adds. Mean scores are shown for each scale and scale ite

[b]Cronbach's alpha (reliability) is shown for scales with two or more items.

Table 2. Effect of Other People on User Satisfaction in Study 1.

Others reduced satisfaction	People per trail mile 0-6	7-21	22-27	28-38
Yes %	14	29	42	59
No %	86	71	58	41
Sample size	80	240	175	54

Chi square = 37.79 p = .001

Table 3 shows a pronounced relationship between perceived skiing ability and whether or not skiers felt other skiers present on the day of the interview reduced their satisfaction. An equally strong relationship was found between other skiers reducing satisfaction and the number of years skied. As the latter increased, skiers were more apt to indicate that other skiers reduced their satisfaction. We hypothesize that these findings are the result of changing motivations to ski-tour as one's experience increases. The more proficient one becomes, the more important solitude is. These motivations are discussed in greater detail in another paper in these proceedings, by Haas.

Table 3. Effect of Other People on User Satisfaction by Perceived Skiing Ability in Study 1.

Others Reduced Satisfaction	Self-perceived Ability Beginner	Inter-mediate	Advanced
Yes %	24	38	45
No %	76	62	55
Sample size	205	272	55

Chi square = 14.75 p = .001

A second question in Study 1 asked respondents to rate how much their satisfaction was reduced by others. The responses indicated that the magnitude of impact was not that great at the time of the study. Thirty-three percent of the skiers felt others reduced their satisfaction more than "a little", and only 6% indicated their satisfaction was reduced greatly or very greatly.

OPINIONS ABOUT MANAGEMENT ACTIONS

Study 2 asked the 1,007 respondents to rate how much they favored, or opposed, 18 possible management actions (Table 4). A 9-point response format ranging from "very strongly oppose" to "very strongly favor" was used.

Skiers most preferred development of different areas for skiers and snowmobilers. The overwhelming majority (87%) of the skiers favored this action to some degree (i.e., $\geq$ response 6 on scale in Table 4); 64% of the respondents favored it strongly (i.e., response = 9). The skiers interviewed were quite homogeneous in their desire to be away from snowmobilers.[4] The feelings of ski-tourers towards snowmobiles has been documented elsewhere in the literature (Knopp and Tyger 1973). Sources of conflict include noise, safety considerations, excessive packing of the track, and a general degradation of the esthetic experience.

Skiers attitudes toward certain types of management actions were found to vary according to their skiing abilities. The management actions marked with an asterisk in Table 4 were identified as forming a scale when analyzed with a hierarchical clustering program developed by Revelle (1979). Inspection of those management actions shows that they all relate to informational and safety types of actions.

[4] None of the characteristics listed in footnote 3 explained more than 3% of the variation in skier's opinions toward management actions related to snowmobiles.

Table 4. Preference for Management Actions in Study 2.

Management actions	Mean[a]	Standard deviation
1. Develop separate areas for skiers and snowmobilers	7.9	2.1
*2. Provide more information on avalanche hazards.	7.6	1.4
*3. Develop winter trails maps.	7.5	1.6
*4. Post map boards at trailheads to identify trail routes and mileages	7.3	1.8
*5. Provide a recorded telephone message giving cross-country ski conditions.	7.0	2.0
*6. Provide trail identification markers along ski routes.	6.9	1.9
7. Expand trail system in heavily-used areas.	6.7	2.2
*8. Rate trails according to skill level: beginner, intermediate, and advanced.	6.7	2.0
*9. Broadcast cross-country ski conditions over local radio stations.	6.6	2.3
*10. Arrange for evening patrols of parking areas to assure that all skiers are out safely.	6.5	2.1
11. Encourage use of lightly used areas.	6.3	2.5
*12. Develop cross-country ski patrol units.	6.0	2.1
*13. Post signs along highway to indicate ski area turnoffs.	5.9	2.2
14. Restrict some heavily-used trails to one-way traffic flow.	5.8	2.4
15. Limit the number of people in heavily-used areas.	5.4	2.5
16. Increase parking area in heavily-used areas.	5.4	2.4
17. Provide separate trails for skiers and snowmobilers in same area.	4.1	3.1
18. Combine skiers and snowmobilers on same trail.	1.4	1.2

[a]Respondents were asked their opinion of the above management actions. Responses were coded (1) very strongly oppose, (2) strongly oppose, (3) moderately oppose, (4) oppose a little, (5) neutral or undecided, (6) favor a little, (7) moderately favor, (8) strongly favor, (9) very strongly favor.

*Identified as forming a scale by cluster analysis (Revelle 1979).

Table 5 shows that beginner skiers were more apt to favor information/safety actions than intermediate skiers, who were more apt to favor them than were advanced skiers. The same pattern was found for the management actions not marked by an asterisk, but it was not as strong. Although the magnitude of the differences are not large, the pattern is consistent.

CONCLUSIONS AND IMPLICATIONS FOR MANAGEMENT

Ski-tourers were quite well educated; most were 21 to 35 years old; most rated themselves as intermediate in skiing ability; and the average distance skied in each study was about 5 miles.

Skiers uniformly disliked the presence of snowmobiles while they were skiing. This type of conflict between motorized and non-motorized recreation has long been documented (Lucas 1964, Hendee et al. 1968, Lime 1975). Managers ought to make every effort to separate the two uses. If this is not possible, areas should be adequately signed at trailheads to inform the public of the location of skiing and snowmobiling opportunities.

Table 5. Preferences for Informational and Safety Types of Management Actions by Ability of Skier in Study 2.[a]

Action	Mean Score[b]		
	Beginner	Intermediate	Advanced
More information on avalanche hazards	7.7	7.7	7.3
Develop winter trails map	7.8	7.5	6.8
Post map board at trailheads	7.7	7.2	6.5
Provide recorded phone message giving ski conditions	7.5	7.0	6.2
Provide trail identifications along ski routes	7.3	6.8	6.2
Rate trails by ability	7.4	6.5	5.9
Broadcast ski conditions over radio	7.2	6.6	5.6
Arrange evening patrols of parking areas	7.1	6.4	5.5
Develop ski patrol units	6.6	5.9	5.1
Post signs on highway to indicate ski area turnoffs	6.6	5.8	5.1

[a]See Footnote "a", Table 4 for rating scale.

[b]All F's significant at p = .01, degrees of freedom = 2, 980 for each F test.

The finding that skiers tended to favor informational types of management actions (e.g., develop maps) to restrictive types of actions indicates that managers should first try to solve management problems by disseminating information such as more information on avalanche hazards, development of winter trails maps, and posting map boards at trailheads, before they impose restrictions or increase facilities. Work by Krumpe (1979) in Yellowstone National Park demonstrated that use rates of trails by overnight hikers of different trails can be changed by handing out information pamphlets.

The degree skiers favored informational and safety types of management actions was related to their ability as skiers. This suggests that areas designed for advanced skiers need not be as well marked and patrolled as those for beginner skiers.

All the skiers most highly valued trails through natural areas and views of natural areas. Ski-touring areas should be managed to provide as natural an experience as possible. An exception is that historical structures (old mining sites, old cabins, etc.) were reported to add moderately to satisfaction. Views of roads and cities and trails next to modern man-made structures should be avoided whenever possible.

Data presented show that other persons can detract from the quality of the ski-touring experience. With the increasing popularity of the sport, the social carrying capacity of areas is likely to be strained in the future. Managers should be aware of the trade-offs between the total number of users and the quality of the individual's experience. If the capacity of a certain area is reached, users would prefer to have use dispersed through informational types of actions or expanding the trail system instead of by direct restrictions.

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USING VISITOR PREFERENCE INFORMATION TO GUIDE DISPERSED WINTER RECREATION MANAGEMENT FOR CROSS-COUNTRY SKIING AND SNOWMOBILING

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INTRODUCTION

Should managers obtain preference information from existing and potential visitors to determine the type of dispersed winter recreation management that should be provided? Brown (1975, 1977) elaborating on the work of others has suggested that user preference information in conjunction with estimates of resource capability, institutional directives and an understanding of the existing situation should form the basis of carrying capacity based recreation planning and management. In accordance with Driver and Brown's (1975,1978) conceptually based approach to conducting recreation planning and management, (Brown et al., 1976, 1978; Driver, 1979) user preference information includes: types of activities; desired physical (rugged terrain), social (seeing groups involved in motorized recreation), and managerial (requiring an entry permit to use the area) characteristics of a particular setting; and desired psychological outcomes (being with people) or experiences (Allen, 1979; Haas, 1979; and Manfredo, 1979).

This paper reports on a larger study initiated as a pilot effort to assist Forest Service managers in the implementation of a recreation planning process for the Fourth of July dispersed winter recreation area in northern Idaho (McLaughlin and Paradice, forthcoming). The purpose of this paper is to provide insight that managers can use to help decide what kinds of preference information they should collect to better understand dispersed winter recreation planning and management. Six objectives were formulated to accomplish this purpose. Objective one was to classify users according to activity participation and desired experiences. Objective two was to describe these classifications using collected demographic and psychological outcome information. Objective three was to determine if differences in demographic characteristics or Recreation Experience Preference Scale (REP) scores exist between activity types. Objective four was to determine if differences in demographic characteristics and activity types exist between experience types. Objective five was to determine which setting characteristics, if any, can be used to discriminate between activity types. Objective six was to determine which setting characteristics, if any, can be used to discriminate between experience types.

STUDY AREA

The Fourth of July dispersed winter recreation area (hereafter FOJ Area) is designated as both a x-country ski and snowmobile use area. It is located in northern Idaho near Lake Coeur D'Alene and approximately 45 miles east of Spokane, Washington. It is on public land that is managed for multiple use by the Idaho Panhandle National Forests. Within the surrounding five county area of approximately 5 million acres (49% Federal Land) there are estimated to be 820 miles of groomed snowmobile trails and 120 miles of designed x-country ski trails of which 102 miles are groomed on an intermittent basis. A regional population of approximately 400,000 are the potential users of these winter recreation opportunities.

The FOJ Area is located on the Fourth of July Pass at an elevation of 3081 feet. It is bisected by Interstate 90 running east and west. Snowmobiles use the side north of the highway while x-country skiers have adopted the southern side as their domain. This arrangement which evolved through an unspoken consensus is now reinforced by management practices (signing) now in use. Snowmobiles are able to connect with a network of over 54 miles of groomed trails. X-country skiers have 23 miles of loop trail and 22 miles of trail running from the pass west downhill to Lake Couer D'Alene. Approximately half of all the groomed ski trails in the five county area are located at the FOJ Area.

The physical setting is best described as even aged coniferous forest setting. The rolling topography provides opportunities for views of surrounding mountains but most often the user is surrounded by dense forest or open areas that have been harvested. The social setting outside

the common parking area is relatively uncrowded. Snowmobilers and x-country skiers reported approximately 4 encounters with other parties per trip. About 84 percent of both user groups reported that the number of parties they saw was about right. Noise from the interstate highway and snowmobiles can be heard along portions of the ski trails. In addition, approximately 98 percent of the x-country skiers and 79 percent of the snowmobilers list separate designated trails as a key reason for using the area. Elements of the managerial setting are limited to trail signing, parking facilities, a brochure and intermittent trail grooming.

METHODOLOGY

The population studied consisted of weekend dispersed winter recreation users that park along the Interstate or in the parking lot at the Fourth of July Summit. Cluster sampling was used. The rationale for its selection included cost constraints, inaccuracy of availabile population estimates and the need to make data-gathering an efficient procedure. Eight weekends (Saturday and Sunday) during the months of February and March of 1979 served as clusters available for sampling. Clusters were limited to these times during the normal winter use period (early December to early April) due to the project initiation date. Because of transportation costs, only seven of the eight weekends were sampled. In addition, a total sample size of 200 was dictated by survey printing costs. As a result of these limitations, approximately 29 users (200÷7) needed to be selected each weekend. Users were randomly selected according to their seating position in their vehicle as they entered the parking areas. On-site sampling began at 9:00 A.M. and ended at 4 P.M. and was conducted as described until 29 surveys were administered over the two-day period. Based upon these procedures the researchers assumed a probability sample for statistical analysis.

An interview/mail survey approach was used to collect data. Recreation managers responsible for the FOJ Area and dispersed winter recreation users assisted the researchers in the design of the questionnaire. It was constructed and administered according to Dillman's (1978) Total Design Method. The questionnaire was pretested on a group of students and a group of middle-aged citizens who resided in Moscow, Idaho. The vast majority of the members of both groups had previously participated in x-country skiing and/or snowmobiling. The final survey was administered to the sampled individuals in the parking area as they got out of their vehicle. Trained interviewers, after briefly introducing themselves, the organization they represented, and the purpose of the study to each subject, recorded the selected user's name, address and response to several questions. Each subject was given a numbered envelope containing a cover letter, a questionnaire and postage paid return envelope. The response rate was 89 percent with 176 questionnaires returned out of 198 distributed. Because of the high response rate, a non-response bias survey was not conducted.

Two nominal classifications; activity types, (snowmobilers, x-country skiers) and experience types, (groupings of individuals seeking similar bundles of psychological outcomes) served as dependent variables. Measures of attitude toward physical, social and managerial setting characteristics served as independent variables.

Experience type classifications were developed using selected Recreation Experience Preference (REP) scales. Driver (1977) states: "REP scales ... identify and quantify the relative importance of different psychological outcomes that are desired and expected from recreation participation (p.1)." The selected domains measured using Driver's (1977) Preference Domain names were: (1) relationships with nature; (2) exercise-physical fitness; (3) social contact or being with people; (4) escape physical pressures. Outcome scales within the domains were selected based on their intuitive appeal and the previous work of Sauer and McDowell (1975) which showed high mean scores for snowmobilers and x-country skiers on domains 1-3. The specific scale items used in the questionnaire differed in all cases slightly from Driver's (1977) wording due to the need to fit the format of the question. In addition, several scale items were taken from an earlier item pool and have since been modified. A 7-point response format, ranging from "Adds To" to "Detracts From" users satisfaction and experience was used to rate each item according to the winter recreation experience a person was engaged in at the FOJ Area.

In an attempt to measure setting opportunities, items were developed to reflect the existing physical and social setting characteristics and possible management setting characteristics that had a potential to be enacted at the FOJ Area. The wording of the items and attributes addressed were modeled after the then uncompleted work of Haas (1979). The items used were as follows:

I. Existing Physical Setting Attributes
- -presence of public cabins
- -presence of private cabins
- -presence of logging activities
- -clear sunny weather
- -complete silence
- -seeing wildlife
- -scenic overlooks
- -dry, cold snow conditions
- -cold snowy days

-views of mountains
-hearing highway noise
-wind blowing through trees
-untracked open meadows
-viewing water
-presence of mining
-groomed trails
-seeing elk
-rugged terrain
-seeing Bald Eagles

II. Existing Social Setting Attributes
-solitude (not seeing many other people except those in your party)
-little evidence of previous visitors
-seeing an individual involved in non-motorized recreation
-seeing individual involved in motorized recreation
-seeing groups involved in non-motorized recreation
-seeing groups involved in motorized recreation

III. Possible Management Setting Attributes
A. Possible Services and Facilities
-heated shelters at the parking area
-more parking
-more publicity for area
-a snack bar
-snowmobile loading ramps
-more groomed trails
-better trail guides
-a supply of maps
-more trails
-longer trails
-loop trails
-small open shelters along the trails
-outhouses along the trails
-more trail markers

B. Potential Management Practicies
-regular patrolling by the U.S. Forest Service
-emergency help throughout the area
-the use of volunteers to assist in area management and maintenance
-more nature interpretation along the trails
-manicuring the trails
-encouraging large groups to use the area
-limiting the number of people using the area
-requiring an entry permit to use the area
-setting user fee for use of the groomed trails
-discouraging use of the area by large groups

These items were rated by subjects using a 5-point response format, ranging from very desirable to very undesriable. For the purpose of data analysis, each of the above items was assumed to measure a characteristic of the setting, and no attempt was made to construct a scale.

Responses to the questionnaire were analyzed using the Statistical Package for the Social Sciences (SPSS) (Nie et al, 1975; Hull and Nie, 1979) and the Normal Mixture Analysis Package (NORMIX) (Wolf, 1970).

The SPSS CROSSTAB program was used to classify each subject into activity types on the basis of their response to a question asking them why they visited the area. Only subjects belonging to two classes (snowmobiling and cross-country skiing) were used. NORMIX was used to group individuals desiring similar experiences using a respondent's mean score on the REP scales. General descriptions of activity and experience types using selected demographic variables and outcomes were developed using frequencies, means and medians. The Wilcoxon rank sum test (Siegel, 1956) was used to determine differences between activity types and selected demographic variables. The Student's t-test (Hayes, 1973) was used to determine if there were differences between activity types based on scores from the REP scales. The Kruskal-Wallis one-way ANOVA (Siegel, 1956) was used to determine if differences existed between experience types and selected demographic variables. The DISCRIMINANT program within SPSS was used to determine which attributes of the setting opportunity (physical, social, managerial) distinguished between activity types. Discriminant analysis (Morrison, 1967) also was used in the same fashion with regard to experience types.

LIMITATIONS

The findings reported in this paper are limited to one case study of a dispersed winter recreation area in northern Idaho and should not be generalized to other areas. This also represents a particular set of behaviors and attitudes recorded at one point in time and should not be projected to future times because preferences and tastes may change. Furthermore, it is realized that the items developed to measure setting attributes need to be further tested to insure validity and reliability. But due to the pilot nature of the study, their use was appropriate. Also, the use of scores for each item in the discriminate analysis reflects our unwillingness to assume attribute scales (clusters) or domains of attributes at this point. All of these factors must be kept in mind when considering the results.

RESULTS AND DISCUSSION

Objective 1. Of the 176 respondents, 129 were cross-country skiers, 34 were snowmobilers and 13 were classified as other. The cross-country skier and snowmobiler subsamples were defined as activity types.

NORMIX analysis identified four groups of experience types. Driver's (1977) clusters (REP) scales) used in object typing were general nature experience, exercise-physical fitness, being with similar people and privacy. A chi

square analysis (Wolf, 1970) to test the hypothesis that there were four types instead of three was significant at the .05 level (X^2 = 76.64, 8 df), however the test for five types instead of four was not significant (X^2 = 15.07, 8 df). Figure 1 presents a graphic profile of each experience type.

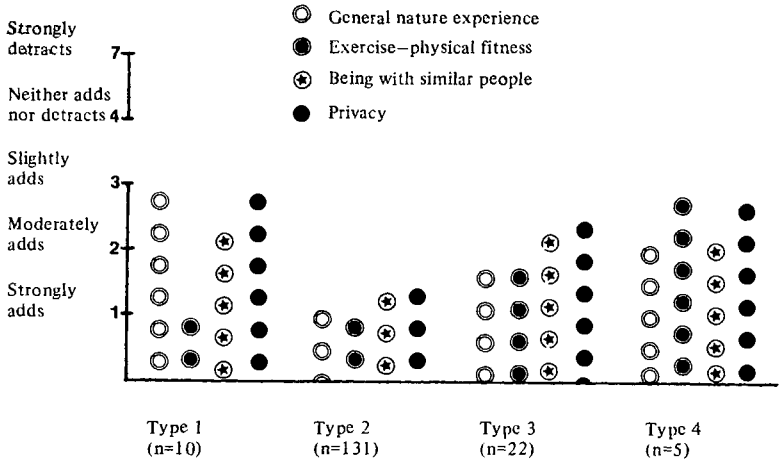

Figure 1. Graphic Profile of Experience Types

Experience type 1 can be described as a group of individuals who prefer an exercise driven, social interaction oriented experience that relies to a lesser degree on interaction with the natural environment. Readers are encouraged to derive descriptions for experience types 2-4. Such descriptions in combination with the sample size of each group provides managers with insights about the proportions of the experiences sought at an area. Managers also might find such information useful in understanding the conflicts they observe at a winter recreation site.

Objectives 2 & 3. Table 1 presents demographic information which further describes activity types. Snowmobilers are significantly

Table 1. Median Scores for Activity Types on Selected Demographic Variables[a]

Demographic Variable	X-C Skiers (n=128)	Snowmobilers (n=33)	Z Value	Significant .05 Level
Age	28.2	42.0	-4.69	0.0001
Education	15.8[b]	12.3[b]	-4.30	0.0001
Income	4.4[b]	4.4[b]	-0.49	NS
Experience Level	2.9[c]	3.9[d]	-3.35	0.0008

[a]Wilcoxon Rank Sum Test was used.
[b]15,000-19,999
[c]Advanced intermediate
[d]Experienced

older than x-country skiers. The education level of the two groups is significantly different. Snowmobilers have completed a high school education and x-country skiers a four year college education. This finding is similar to a study of Minnesota users conducted by Knopp and Tyger (1973). There is no significant difference between the incomes of both groups. The experience level of the two groups was also significant. X-country skiers rated themselves as being advanced intermediate in experience while the median rating for snowmobilers was experienced.

A social group type demographic variable was defined according to three classes: (1) nuclear family; (2) non-family; and (3) combination (e.g. family with friends or relatives). A chi-square test was utilized to measure the relationship between activity types and social group types. The chi-square value obtained was significant (X^2=12.184, df=2, α=.05). A Cramer's V of .145 was obtained indicating a low degree of association. Approximately 70% of the sampled snowmobilers were family groups in contrast to 39% of the x-country skiers.

Table 2 displays the mean scores for the Recreation Experience Preference Scales according to activity type. No significant difference was found for any scale between the two

Table 2. Mean[a] Scores on the Recreation Experience Preference (REP) Scales for Activity Types[b]

REP Scale	X-C Skiing[c] (n=127)	Snowmobilers[c] (n=33)	T Value	Significant .05 Level
General nature experience	1.344	1.282	1.71	NS
Exercise physical fitness	1.138	1.203	.52	NS
Being with similar people	1.679	1.470	-.53	NS
Privacy	1.752	1.833	-.69	NS

[a]The means could range from 1=strongly adds to experience to 7=strongly detracts from experience.
[b]Student's t-test was used.
[c]1=most important desired experience
2=second most desired, etc.

activity groups. Sauer and McDowell (1975) reported the same finding for the first three of the scales listed in Table 2. Their study investigated the characteristics and preferences of snowmobilers and x-country skiers of the Roosevelt National Forest in Colorado. It is interesting that the rankings of mean REP scale scores are identical. In both cases exercise is the most important experience desired by

these very different activity types. As Sauer and McDowell (1975) work suggests, each group's perception of exercise probably differs. If this is the case, caution must be used in describing experience types according to the generic meanings of scale items.

Objective 4. Using a Kruskal-Wallis one-way ANOVA test (Siegel, 1956) no significant difference was found at the $\alpha = .05$ level between experience types and age, education, income and experience level. This finding is not unexpected since Driver's (1977) approach to REP scale development has included the deletion of items which differentiated between individuals on the basis of demographic variables.

No significant ($\alpha = .05$) relationship was found between activity types and experience types; and between experience types and social group type using the chi-square statistical test. These findings, along with the previous one suggests that the REP scales are useful in measuring some property of recreation behavior that seems to be independent of the activities of x-country skiing and selected demographic characteristics.

Objectives 5 & 6. We believe that if managers are to be able to successfully supply recreation users with a satisfying recreation experience and at the same time protect the resource, they need to know which setting attributes are important to particular recreation activities. One way to determine which characteristics of a setting distinguish between activities and between experiences which take place in similar settings is to use discriminant analysis.

Discriminant analysis is a multivariate technique which uses a series of discriminating variables (the items reflecting the characteristics of the FOJ setting listed in the methods section) to divide individuals or objects into predetermined groups (activity types and experience types). The objective is to combine the discriminating variables in a form that causes the groups to be as statistically distinct as possible. This is done using a discriminant function which is somewhat analogous to a multiple regression equation. The advantage of discriminant analysis is that the dependent variable, the a priori groups, (activity types, experience types) may be nominal while multiple regression requires interval data for dependent variables. The discriminating variables or independent variables are assumed to have a multivariate normal distribution and equal variance-covariance matrices within each group. It should be noted that this technique is robust and strong adherence to these assumptions is not absolutely necessary (Nie, et al., 1975).

The first set of discriminant analyses conducted used activity types as the dependent variable and each separate set of attributes: (1) existing physical; (2) existing social; (3) possible services and facilities; and (4) potential management practices as discriminating variables. A duplicate set of analyses was conducted substituting experience types as the dependent variable. Results are reported in detail for analyses that could correctly predict more than 80% of the actual a priori groups.

Table 3 presents the results of a stepwise discriminant function of activity type versus physical setting attributes. It is evident from the table that not all the attributes of the physical setting (see methods section) that were measured are included in the discriminant function. This is because some attributes do not discriminate between groups. In other words, they may be common to both activity types. Managers should not disregard these attributes in their management planning process but rather look at them as baseline characteristics considered by all users. The analysis reveals only the best discriminating variables that separate the two activity types. Interpreting a discriminant function is somewhat similar to interpreting a regression equation. The magnitude of the standardized coefficient, independent of sign, indicates the importance of that attribute to the function. The sign denotes whether the attribute is making a positive or negative contribution to the function (Nie et al., 1975). In this case, the two most discriminating variables were "complete silence" and "presence of mining." To validate the discriminant function in Table 3 it is customary to determine how well it can be used to classify individuals, on the basis of their ratings of attributes, into the actual group (snowmobiler, x-country skier) to which an individual belonged. This validation classification in Table 4 shows that 80.8% of the x-country skiers were correctly classified and 89.7% of the snowmobilers were correctly classified for a total of 82.4% of all cases correctly classified.

The usefulness of this discriminant analysis for management lies in the fact that it has identified the most discriminating physical setting variables. Management insight can be gained by calculating the mean desirability ratings of these variables for each group type. In this particular case the comparison of means (see Table 3) reveals that x-country skiers found complete silence more desirable than snowmobilers while snowmobilers were more accepting of mining activities.

A similar procedure of analysis was followed using activity types and items which were believed to constitute the social setting. The resulting discriminating function separating x-country skiers and snowmobilers, and the validation matrix are presented in Tables 5 and 6.

Table 3. The Stepwise Discriminant Function of Activity Types on Physical Setting Attributes

Physical Setting Attributes	X-C Skiers Mean[a] (n=129)	Snowmobilers Mean[a] (n=34)	Discriminant Function Standardized Coefficients[b]	Canonical Correlation[c] (Explained Variance)[d]	Wilks Lambda[e]	Significance
Complete Silence	1.90	2.61	0.471	0.605	0.634	0.0000
Presence of Mining	4.16	3.45	-0.447	(0.366)[d]		
Viewing Water	2.09	2.00	-0.408			
Groomed Trails	1.97	1.41	-0.331			
Views of Mts.	1.63	1.65	-0.330			
Scenic Overlook	1.57	1.79	0.327			
Cold Snowy Days	2.72	3.33	0.273			
Hearing Hwy. Noise	4.35	3.74	-0.229			
Presence of Logging Activities	4.35	3.53	-0.226			

[a]Mean is based on a five-point scale where 1=very desirable, 2=desirable, 3=neither desirable nor undesirable, 4=undesirable, and 5=very undesirable.
[b]The standardized discriminant function coefficient represents the relative discriminating contribution of the variable to the function. The sign merely denotes whether the variable is making a positive or negative contribution (Nie et al., 1975).
[c]A canonical correlation is a measure of association between a single discriminant function and the a priori defined groups (dependent variable) (Nie et al., 1975).
[d]The canonical correlation squared (explained varience) is the proportion of variance in the discriminant function explained by the a priori defined groups (Nie et al., 1975).
[e]Wilks lambda and its associated chi-square test of statistical significance indicates the discriminating power of the function. The larger the lambda is, the less discriminating power is present (Nie et al., 1975).

Table 4. Validation Clasification: Cross-Country Skiers Versus Snowmobilers by Setting Attributes

Actual Group	Predicted Group Membership	
X-C Skiers (n=125)	X-C Skiers	Snowmobilers
	101	24
	80.8%	19.2%
Snowmobilers (n=29)	3	26
	10.3%	89.7%

Percent of cases correctly classified 82.47%

Table 6. Validation Classification: Cross-Country Skiers Versus Snowmobilers by Setting Attributes

Actual Group	Predicted Group Membership	
X-C Skiers (n=126)	X-C Skiers	Snowmobilers
	118	8
	93.7%	6.3%
Snowmobilers (n=32)	2	30
	6.3%	93.8%

Percent of cases correctly classified 93.67%

Table 5. The Stepwise Discriminant Function of Activity Types on Social Setting Attributes.

Social Setting Attributes	X-C Skiers Mean[a] (n=129)	Snowmobilers Mean[a] (n=34)	Discriminant Function Standardized Coefficients[b]	Canonical Correlation[b] (Explained Variance)	Wilks Lambda[b]	Significance
Seeing Groups in Motorized Rec.	4.57	2.63	-0.496	0.757	0.428	0.0000
Seeing Individuals in Motorized Rec.	4.55	2.62	-0.521	(0.573)		
Seeing Individuals in Non-Motorized Recreation	1.95	2.97	0.269			

[a]Mean is based on a five-point scale where 1=very desirable, 2=desirable, 3=neither desirable or undesirable, 4=undesirable, and 5=very undesirable.
[b]See Table 3 Footnotes for detailed explanation.

A comparison of the means for snowmobilers and x-country skiers on the items in the function reveals that x-country skiers find it very undesirable to see groups or individuals engaged in motorized recreation. Snowmobilers, however, find it desirable to see groups or individuals engaged in motorized recreation. Both x-country skiers and snowmobilers find it desirable to see individuals engaged in non-motorized recreation. This implies that managers should separate the two groups or at least supply an area only for x-country skiing.

The final discriminant function with a validating classification ability greater than 80% used activity types versus possible services and functions (management setting sub-component). The results are shown on Tables 7 and 8. The services and facilities function is dominated by the snowmobile loading ramp attribute and those dealing with more and longer trails. By looking at the means we find, as would be expected, that snowmobilers are in favor of loading ramps while x-country skiers are not. Other management implications are left for the reader to draw. A more detailed treatment of this analysis approach and findings is reported elsewhere (McLaughlin and Paradice, forthcoming).

As Table 9 shows, only three of the eight discriminant analysis conducted were able to validate 80% or more of the subjects as members of the correct group type. This result shows that discriminant analysis was more effective in distinguishing between activity types than experience types. Within the limits of this study this finding suggests that some characteristics of a setting are more directly linked to activity type than experience type.

Table 8. Validation Classifications: Cross-Country Skiers Versus Snowmobilers by Services and Facilities Sub-Component of the Management Setting

Actual Group	Predicted Group Membership	
	X-C Skiers	Snowmobilers
X-C Skiers (n=113)	100	13
	88.5%	11.5%
Snowmobilers (n=30)	3	27
	10.0%	90.0%

Percent of case correctly classified 88.81%

Table 9. Classification Results for Activity and Experience Types by Setting Attributes

Discriminating Variables / Setting Attributes	A Priori Variables: Activity Type	A Priori Variables: Experience Type
Existing Physical	82.47%	56.44%
Existing Social	93.67%	50.93%
Possible Services and Facilities	88.81%	39.07%
Potential Management Practices	68.59%	44.44%

It could be argued that the poor validation ability of the discriminant functions based on experience type versus setting attributes resulted because more attributes relating to activity rather than experience were measured. Also, it must be stated that the pilot nature of this study allowed the researchers to use

Table 7. The Stepwise Discriminant Function of Activity Types on the Possible Services and Facilities Sub-Component of the Management Setting

Services and Facilities Attributes	X-C Skiers Mean[a] (n-129)	Snowmobilers Mean[a] (n=34)	Discriminant Function Standardized Coefficients[a]	Canonical Correlation[a] (Explained Variance)	Wilks[a] Lambda	Significance
Snowmobile Loading Ramps	4.31	2.94	0.674	0.702	0.507	0.0000
Longer Trails	2.40	2.22	0.597	(0.492)		
More Trails	1.86	2.28	-0.545			
A Snack Bar	4.29	3.31	0.487			
More Trail Markers	2.24	1.76	0.439			
Loop Trails	1.74	2.00	-0.367			
More Publicity for Area	3.57	3.63	-0.359			
More Groomed Trails	2.18	1.68	0.323			
Better Trail Guides	2.19	1.88	-0.302			
Shelters Along Trail	2.82	2.84	-0.177			

[a]See Table 3 Footnotes for detailed explanation.

only selected REP scales. As Haas (1979) has shown using regression analysis not all psychological outcomes (desired experiences) are physical setting dependent. This finding suggests that our results must be interpreted with caution because of the mix of scales we used to construct the experience types. It is possible we may not have included those scales most important to the physical, social and managerial components of setting opportunity.

IMPLICATIONS

This study has important implications for both managers and researchers. First, it suggests that all three types of user preference information: (1) types of activities; (2) desired characteristics of a particular setting; and (3) desired experiences can provide managers with important insights about dispersed winter recreation management. The amount of insight seems to vary but the data is not sufficient to conclusively suggest which type of user preference information provides the manager with the most insight for planning and management. Perhaps the question of "most insight" is not even the right question. Rather it should be said that each type of user preference information provides managers with different kinds of insight.

Second, this study suggests that Driver and Brown's (1975, 1978; Brown et al., 1978; Driver, 1979) recreation opportunity spectrum approach to conceptualizing and measuring recreation opportunities, and planning and managing for those opportunities, has potential to help managers better understand dispersed winter recreation users and the management of dispersed winter recreation areas. The approach, however, needs to receive further empirical testing and validation for dispersed winter recreation. Furthermore, as Clark and Stankey (1979) have implied in their recreation opportunity spectrum framework, the linkage between experiences and setting needs further investigation in order to sufficiently prove its usefulness to managers. This is not to say that understanding experience is not important or even essential to understanding the benefits users obtain from participating in a recreation opportunity. In conclusion, the authors believe that all three types of user preference information should continue to be collected to maximize our understanding for dispersed winter recreation planning and management.

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ACKNOWLEDGEMENTS

This study was funded through a cooperative agreement between the Idaho Panhandle National Forests and the University of Idaho Forest, Wildlife and Range Experiment Station. A special thanks to Dr. Edwin Krumpe for his assistance in the preparation of this manuscript.

SOURCES OF CONFLICT AMONG WINTER RECREATIONISTS

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Once relatively tranquil, the winter landscape is now the center of recreational activity for millions of Americans. During the 1970s the number of Nordic skiing enthusiasts grew rapidly, challenging use patterns established by snowmobilers in the 1960s. One result of increased winter recreation use, conflict, involves the ability of each group to achieve the benefits and experiences sought from each activity. These outcomes may include searching for solitude, escaping from the pressures of the everyday world, being with friends and family, learning about and appreciating nature, participating in a challenging, adventurous experience, or becoming a competent winter recreationist. Conflict results when one group prevents the other from achieving these outcomes.

Evidence of the conflict is plentiful. Skiers worry about the "invasion of public lands by squadrons of frightful, noisy mechanical beasts" (Kiesling, 1979). Snowmobilers react negatively to the "unfriendly" actions and antagonism openly exhibited by nordic skiers (Mahoney, 1973).

While these statements are significant commentaries on the intensity of the conflict, they do little to provide for effective solutions, and may often unnecessarily polarize the issue. We suggest that the structure for resolving such conflicts take into account the experiences winter recreationists pursue and the ability of managing agencies to manipulate the setting in which such experiences occur.

The recreation setting (which is the physical, social, and managerial character of the situation in which the activity occurs) provides the means to achieve experiences winter enthusiasts seek (Driver and Brown, 1978). For example, a Nordic skier seeking solitude requires a social setting providing a minimum of encounters with others. Or, a snowmobiler needs a minimum of resource modification (physical setting) in order to appreciate nature.

This paper explores the experiences or social-psychological outcomes sought by Nordic skiers and snowmobilers, and identifies how each group prefers the managerial component of the setting be manipulated. Noise, physical interference, and differing value systems have been previously cited as sources of conflict. However, preferences for the managerial component of the setting (the type and amount of rules which exist) may be as much of a source of conflict as other factors.

CONCEPTUAL FRAMEWORK

Conflicting groups typically share some goals, values, and desired outcomes. For example, Rue (1979) has stated that "the snowmobiler, whether accompanied by a single machine or in the midst of a club trail ride, opts for the same outdoor experience as the hiker or backpacker -- an appreciative guest of Mother Nature." Posewitz (1979) also suggested "that snowmobilers in pursuing their chosen form of outdoor recreation, look for many of the same things that wilderness advocates look for -- primitive settings, deep snow and unmarred scenery are all common denominators among both groups."

There is some empirical evidence that snowmobilers and Nordic skiers seek similar social-psychological outcomes. Driver (1976) found that the two groups shared five of the six most important expected outcomes of recreation participation. These shared outcomes included experiencing nature, exercise, being with friends, change-variety, and exploration.

Such similarities in expected outcomes may seem contradictory to the notion (Jacob, 1978) that conflict results from goal interference. Goals can only be interfered with if (1) one perceives an incompatibility between two groups and (2) one is aware of the other group's presence. The perception of incompatibility deals with how one defines the appropriateness of certain behaviors at a particular place (Lee, 1972). In Kelley's (1979) study, for example, of a hiker-motorcyclist conflict situation, significant differences were found in how each group defined the appropriateness of certain recreation behaviors, including Christmas tree

cutting, riding horses, bicycling, car camping, mountain climbing, hunting and fishing.

Lee suggests one's recreation behavior is subject to normative constraints which order this behavior in a way similar to what occurs in "work time": selection of places and appropriate recreation activities depend on the existence and enforcement of reference group norms. Outdoor recreation areas are "places" which derive their definition (or meaning) from the social group(s) using that area. Lee feels that the normative order of outdoor recreation places may be described in terms of:

1. Mode of belonging
2. Cognitive structure or the environment
3. Expectations of social control concerning the use of space.

Mode of Belonging

According to Lee the mode of belonging is the sense of "being at home" and the secure knowledge that one has a right to be "there." Everyone has experienced the discomfort of being thrust into a strange social environment. This security in an environment is achieved through two methods: possession or knowledge. Security through possession results from formalized rules of property ownership; the rules indicate how one is to behave in a specific situation. On the other hand, belonging through knowledge is achieved through the ability to predict the behavior of others; socialization into the group's norms makes one aware of the appropriate behavior. In more down to earth terms, the designation of a place as a national park or wilderness would represent belonging through possession--formalized rules and regulations state the appropriate behavior. In a place where no formal designation exists, belonging may be achieved through participation with a familiar social group, whose behavior can be predicted by individual participants.

Both Nelson (1976) and Kelley (1979) suggest that social group norms influence recreation site behavior more among mechanized than the non-mechanical recreationists. We hypothesize that snowmobilers will prefer a knowledge mode of belonging while Nordic skiers will prefer a possessive mode.

Cognitive Structure

Lee states that the boundaries between places are important in influencing appropriate behaviors and within a boundary there are specific expectations of these appropriate behaviors. According to Lee, boundaries may be sharp yet permeable and, as a result, open spaces are public and belong to no one in particular. Alternatively, spaces may be bounded locally by homogeneous groups of individuals and defined by those groups as belonging to themselves. In Lee's terms, the former represents a selective structure of environment while the latter suggests a territorial organization.

Snowmobilers generally feel that public lands should be open without restrictions: "Areas that 'stir the imagination' should be available for all to appreciate . . . People who live and work in these areas should not be deprived of their right to experience nature by the means of their choice" (Rue, 1979). Nordic skiers, however, have long advocated separate zones for snowmobiling and skiing. Thus, we hypothesize that skiers will exhibit territorial definitions while snowmobilers will prefer selective definitions.

Social Control

The final aspect of place definition is how the organization and use of space will be achieved, or how appropriate behaviors will be defined and regulated. Again Lee poses two extremes: practical and formal. Practical control influences by informal "guidelines"--peer norms--that are minimal, enforced by groups, focused only on problematical situations. Formal control involves the development and publication of regulations by a land management agency.

During hearings on proposed agency regulations snowmobilers often indicate that such rules are not needed; emphasizing instead the role of clubs and organizations. Knopp and Tyler (1973), however, found that Nordic skiers were more likely to argue for formalized rules--mainly to limit conflicting activities. We hypothesize that skiers will exhibit preferences for formalized means of social control while snowmobilers will prefer practical means.

METHODOLOGY

Data were collected in Winter 1979 to test these hypotheses. The Nordic skier population consisted of all skiers visiting two popular winter recreation areas in the Missoula, Montana, vicinity. On randomly sampled days, individuals returning from trips into these areas were contacted, informed of the study purpose, and asked to cooperate. At the Rattlesnake watershed immediately adjacent to Missoula, sample times included all days of the week. At Lolo Pass, about 40 miles southwest of Missoula, skiers were sampled on weekends only. A total of 261 Nordic skiers were sampled.

The sampling plan originally called for contacting snowmobilers during the same period used for Nordic skiers. Unexpected powder snow conditions, however, limited snowmobiling within this sampling frame. Snowmobile registrants in and near Missoula were substituted. A 33 per cent systematic random sample yielded 316 names and addresses.

Each person sampled was sent a mail return questionnaire immediately following the sampling effort. The original mailing and two follow-ups yielded a total response of 185 skier questionnaires (70.9%) and 154 snowmobilers (48.7%). The lower rate of response from the snowmobiling group was likely due to the lack of personal contact during the sampling period.

The questionnaire sent to each respondent involved several components: (1) characteristics of the recreationist and location of the last area visited, (2) scales measuring the importance of various expectations to the visit, (3) a scale assessing definitions of place, and (4) standard sociodemographic information.

RESULTS

Of course, skiers and snowmobilers may organize the social component of the experience somewhat differently. Snowmobilers are often depicted as gregarious individuals seeking a group experience while the Nordic skier is viewed as an individual more likely seeking solitude and quiet. The results showed distinctive differences in the social organization of the two experiences. Over 80% of the Nordic skiers participated in groups of four persons or less contrasted to only 41% of the snowmobilers. Snowmobilers were most likely to be found in groups composed of families while skiers were most likely to be in groups of friends. While there are differences, it should be noted that group participation is an important feature of both; only a few individuals actually engage in these winter recreation experiences alone.

To assess expected social-psychological outcomes, respondents rated 20 different statements selected from an item pool (Driver, 1977) designed to represent the following outcome domains: Learning about Nature, Appreciating Nature, Stress Release, Solitude, Competence, Challenge, Action/Excitement, and Affiliation. Respondents rated each statement on a scale of 1, not at all important, to 6, extremely important. Following the data collection, the 20 items were factor analyzed, rotated orthogonally, and scales were developed from items loading on each factor.

Respondents tended to combine several domains that had previously been thought to be separate. Learning and Appreciating Nature were combined into one scale as were Competence/Challenge and Stress Release/Solitude. Reliability coefficients (Nunnally, 1967) were above .80 for all scales except Action/Excitement which was .53. Because of this low reliability, it will not be discussed further.

Are the outcomes sought be Nordic skiers and snowmobilers different? Table 1 shows the results of t-tests on each of the four remaining scales. Note that Stress Release/Solitude was least important for Nordic skiers while Competence/Challenge was least important for snowmobilers. Learning/Appreciation was most important for snowmobilers. Although two of the scales showed statistically significant differences (with the skiers having higher mean values) means were close to the "moderately important" position suggesting little real difference between the two groups.

Table 1. Mean Values of Outcomes by Travel Method

	Travel Method	
Outcome	Nordic	Snowmobile
Nature Learning/ Appreciation*	4.43	3.93
Affiliation	4.01	4.10
Competence/ Challenge*	4.03	3.42
Stress Release/ Solitude	3.87	3.67

*T-test indicates that differences between means statistically significant at the $\alpha = .01$ level.

Of importance are the nearly equal mean values on the Affiliation scale. This suggests that Affiliation may be related more to the social organization of the trip than the travel method. To test this hypothesis, a two way analysis of variance was conducted to test the effects of group type and size on the importance of Affiliation. Affiliation was related only to group type. Individuals visiting the area alone scored lowest while those in groups of friends scored highest.

Given that the expected outcomes between the two groups are similar, are their definitions of place as hypothesized? Individuals were asked to respond to a 12-item scale developed and pretested by the authors to tap the three domains suggested by Lee. The data were factor analyzed and rotated orthogonally. Ten of the 12 items loaded on three factors. The first factor--cognitive structure of the environment--apparently worked well, explaining two-thirds of the variation in scores and yielding a very high scale reliability (.87). The items for the two other dimensions did not work as well as evidenced by the low factor loadings and low scale reliabilities (.60-.62).

To test the hypothesis that there are differences in definition of place, a t-test was conducted with travel method as the independent variable. Results are shown in Table 2. For the cognitive structure scale, low scores indicate a territorial definition and high scores suggest a selective definition. The hypothesis that Nordic skiers would hold territorial definitions and snowmobilers selective definitions is supported by the data.

Table 2. Mean Values of Definitions of Place by Travel Method

Definition	Travel Method: Nordic	Snowmobile
Cognitive Structure *	1.91	3.36
Social Control*	3.47	3.00
Mode of Belonging	2.20	2.32

* T-test indicates that differences between means statistically significant at the $\alpha = .01$ level.

Differences concerning expectations of social control are also statistically significant. Snowmobilers appear to prefer informal guidelines for behavior management while Nordic skiers prefer more formalized rules and regulations.

Differences in the mode of belonging scale were not statistically significant. The low scale score of both groups suggests a knowledge mode versus a possessive mode. The lack of difference, of course, may also be due to the relatively low reliability of the scale. Additionally, the authors feel that the current description of the concept is vague and difficult to operationalize.

DISCUSSION

While this study did not examine the full range of outcomes possible, the results here and those of Driver (1976) suggest similarities in the experiences sought by Nordic skiers and snowmobilers. While there are differences, one is struck more by the overall pattern of similarities. It is possible that the groups could differ on outcomes not measured. However, these outcomes such as physical fitness, autonomy, privacy, risk-taking, and status are not as subject to managerial intervention in this situation as those studied.

This finding has several implications for winter recreation managers. First, the relatively high scores for Nature Learning/Appreciation suggests needs to provide opportunities in physical settings which have a minimum of resource degradation and incompatible visual intrusion. While pristine environments are not necessary, routing trails through areas showing little resource modification would enhance the experience. Additionally, interpretive programs may also serve to raise the overall level of satisfaction.

Second, the relatively low priority given to Stress Release/Solitude and slightly higher scores given to Affiliation indicate the social component of the experience is important to winter recreationists. This suggests that encounters with others--at least of the same travel method--are not likely to be a significant source of disatisfaction. Thus use limit policies would have minimal positive impact on the experience and would serve only to limit opportunity.

Third, the higher score given Competence/Challenge by Nordic skiers indicates that opportunities providing a variety of difficulties and skill requirements would be attractive. These would allow skiers to learn new skills, improve their current level of competence, and challenge their abilities.

Snowmobilers placed highest importance on Affiliation, and the social organization of the trip (large group sizes and groups of families) suggests that managers must be sensitive to this need. Practically, it means providing opportunities where snowmobilers can gather in large groups and engage not only in snowmobiling, but a variety of related socially oriented activities. While skiers placed an equal level of importance on being with other people, they tended to be in smaller groups of friends.

The findings concerning differences in definitions of place are also significant. Snowmobilers feel that lands are open and available to a variety of users while the Nordic skiers examined here prefer that areas be established for specific winter activities and experiences. These differences in how the environment should be structured reflect the original assymetrical nature of the snowmobile-Nordic skiing conflict. It also suggests that in order for skiers to achieve their experience outcomes, special areas where snowmobiles are prohibited may need to be provided in some situations. While this suggestion is nothing new, the difference in perspectives may help the managers understand the various dimensions of the conflict.

The difference concerning expectations of social control also has implications for management. The snowmobiler, defining places as open and belonging to no one in particular, sees no real need for rules and regulations beyond some minimum ones in order to achieve expected outcomes. And, these guidelines will probably be met more favorably if they are communicated with groups of snowmobilers. Nordic skiers prefer formalized rules and approaches to social control. This may reflect a need to prohibit snowmobile intrusions into the experience. And, given the relatively low level of social organization of Nordic skiers, rules and brochures may be the only effective way for agency communication.

It is quite likely that outcomes and definitions of place vary among locations. An important implication is that planners and researchers need to identify the extent of such variations such that experience opportunities could meet a diversity of needs. This suggests further research to link specific outcomes with specific components of the recreational setting.

This study did not address other components of the conflict. There are very likely major differences in world view, lifestyle, and environmental awareness that would contribute to dissatisfaction even if all other components were resolved: simply observing an individual whose behavior represents a differing lifestyle can be upsetting to many people. Research is needed to estimate the significance of these components in any given conflict situation.

Yet the similar outcome profiles provide a common ground for conflict resolution. Building upon this common ground would lead to communication and negotiation between the conflicting groups. The challenge to the managers, therefore, is to facilitate this exchange.

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COMPARING ATTITUDES OF WISCONSIN RESIDENTS AND SNOWMOBILERS REGARDING USE OF SNOWMOBILES ON PUBLIC LAND

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In North America's snowbelt regions, more people are participating in winter recreation. Such activities as downhill skiing, skating, and sledding have long been popular and recently, snowmobiling, cross-country skiing and winter camping have grown in popularity. For example, in 1977 an estimated 13.8 million Americans went snowmobiling (Sheridan 1979). Cross-country skiing is the fastest growing outdoor winter recreation activity and some recreation planners expect it to become more popular than snowmobiling during the 1980's (Sheridan 1979).

Growing participation in these forms of dispersed winter recreation has increased competition for use of public lands, especially forested lands. In deciding whether to accommodate some activities, managers have been limited because they could not adequately assess the feelings of various people toward proposed policies.

To insure adequate public participation, federal and most state land management agencies have been given legislative mandates to solicit public opinion of management proposals. Public participation in winter recreation planning is important because those who are both vocal and interested in such proposals frequently make their feelings known, but, the attitudes of other members of the public have received little systematic attention and is often not considered.

This paper explores differences in beliefs of participants and nonparticipants in snowmobiling regarding managing that activity. Snowmobile participants presumably are aware and interested in the consequences of management activity, while nonparticipants would seem to be more casual towards it. Further distinction in attitude is made between snowmobilers affiliated with recreation-oriented organizations and those who were not, and between members of the general population who participated in recreation on public forested land and those who had not.

The following three hypotheses are tested:

1. Snowmobilers are less likely to favor regulations limiting the use of public land for snowmobile use than are nonsnowmobilers.
2. Snowmobilers affiliated with snowmobile clubs or other recreation organizations are less likely to favor regulations limiting public land use than are those who have no affiliation.
3. Nonsnowmobilers who do not use forest lands for recreation are less likely to favor regulations to limit use than are nonsnowmobilers who do use forest lands.

METHODS

Land managers of the Nicolet and Chequamegon National Forests in Wisconsin were interested in public feeling toward alternative management strategies for regulating snowmobiles and other off-road vehicles on national forest lands. In the fall of 1973, a questionnaire was mailed to a statewide random sample of 800 phone subscribers living in Wisconsin (George Banghof and Company 1974). In the winter of 1974, the questionnaire was administered to 260 people who were snowmobiling in the Chequamegon National Forest (Leatherberry 1976). From the completed questionnaires, two samples were drawn. One was composed of the 225 respondents who indicated they or members of their families were active snowmobilers (had been snowmobiling over 10 times in past three years), and resided within 100 miles of either national forest. Presumably these snowmobilers would be most affected by and interested in a particular management strategy. Further distinction was made among snowmobilers affiliated with such outdoor recreation organizations as snowmobile clubs (N=148) and those who were not (N=75).

The second sample was composed of respondents who said they used neither snowmobile nor other off-road vehicles and were not affiliated with an outdoor recreation or conservation organization (N=280). Presumably, these people were representative of the Wisconsin population who did not feel strongly about snowmobile or other off-road vehicle use or users. Further distinction was made among those who had visited either of the national forests in Wisconsin for recreation (N=124) and those who had not (N=156).

Respondents in these categories were asked to state the degree to which they agreed or disagreed with five snowmobile activity management strategies.

RESULTS AND DISCUSSION

Attitudes Toward Snowmobile Use

Differences between snowmobilers' attitudes and nonsnowmobilers' attitudes regarding management activity is presented in Table 1. The five management strategies concerning snowmobile use on national forest land ranged between prohibiting all use to placing no restrictions on use. The majority of both snowmobilers (70 percent) and nonsnowmobilers (91 percent) felt use should be restricted to trails, and that certain areas should be set aside where no use is allowed (86 percent and 91 percent, respectively). Few snowmobilers (12 percent), or nonsnowmobilers (four percent), felt there should be no restrictions on use. Conversely, the vast majority of snowmobilers (92 percent) felt use should not be prohibited. The nonsnowmobilers were more adamant in their feelings about prohibiting snowmobile use on forest lands--more than one-fourth thought use should be prohibited and one-fifth were undecided. The two groups differed over allowing unrestricted use in certain areas, both on and off trails. Slightly over one-half (53 percent) of the snowmobilers felt there should be no restrictions and 11 percent were undecided, while nearly two thirds (60 percent) of the nonsnowmobilers felt there should be some restrictions.

Attitudes of Snowmobilers Compared to Nonsnowmobilers

Table 2 depicts the results of testing for significant differences between snowmobilers and nonsnowmobilers. To measure the intensity of feelings, responses were scored as follows: four points for strong disagreement, three points for disagreement, two points for an undecided response, one point for agreement, and no points for strong agreement. For each management alternative, the lower the score the stronger the feeling of agreement. The Mann-Whitney U test was used to determine if significant differences exist between the response of different group members to the alternative statements.

Results show snowmobilers registered significantly more opposition to proposed regulations to limit snowmobile use. There were significant differences ($p<.05$) in viewpoint between snowmobilers and nonsnowmobilers on all but the strategy that would set aside areas where snowmobile use is prohibited. (Table 2). The hypothesis that snowmobilers are less likely to favor regulations to limit snowmobile use than are nonsnowmobilers is supported.

The snowmobilers' strong opposition to the alternative strategies reveals that as a group, they are not opposed to regulations but feel their vehicles should be allowed on public land. Indicative of this feeling, is their response to the strategy which would allow vehicles to travel anywhere in certain areas. Here, their composite feeling is close to being neutral or undecided.

Table 1. Differences between Wisconsin snowmobilers and nonsnowmobilers in attitude toward five management alternatives for snowmobile use

(in percent)

Proposed strategies for managing snowmobile use	Snowmobilers (N=223)			Nonsnowmobilers (N=280)		
	Agree	Uncertain	Disagree	Agree	Uncertain	Disagree
Prohibit all use	4	4	92	29	21	50
Set aside areas for no use	86	5	9	91	17	2
Restrict use to trails or routes	70	4	26	91	4	5
Allow use anywhere in certain areas, both on and off trails	53	11	36	30	10	60
No restrictions on use	12	2	86	4	4	92

However, nonsnowmobilers seem to feel strongly that off-road vehicle use on public land should be regulated. Like snowmobilers, they are not sure if vehicles should be allowed to travel anywhere in designated areas on public land, however, their reasons for feeling so may be different. Indeed, their stance may reflect less receptivity toward snowmobile use on public lands. As a group, their feelings toward prohibiting use was neutral or undecided.

Attitudes of Affiliated Snowmobilers Compared to Nonaffiliated Snowmobilers

One hypothesis of this study was that snowmobilers affiliated with recreation organizations-snowmobile clubs or similar organizations-would oppose regulations that prohibit use more strongly than those not affiliated with such organizations. This assumption proved false--there were no significant differences in viewpoint between affiliated and nonaffiliated snowmobilers ($p<.05$).

Table 2. Difference between snowmobilers and nonsnowmobilers in mean intensity of feeling toward five alternatives for managing snowmobile use

Proposed strategies for managing snowmobile use	Mean Scores[1] Snowmobilers (N=223)	Nonsnowmobilers (N=280)
Prohibit all use	3.3*	2.1
Set aside areas for no use	0.87*	0.51
Restrict use to trails or routes	1.32*	0.53
Allow use anywhere in certain areas, both on and off trails	1.86*	2.46
No restrictions on use	3.11*	3.50

[1]Value range from 0 to 4. Value of 0 indicates strong agreement, value of 4 indicates strong disagreement.

*Significant between study groups at .05 level.

Attitudes of Nonsnowmobilers Who Use Forest Lands Compared to Those Who Do Not

It was hypothesized that Wisconsin residents who did not snowmobile and had not recently visited (within the past three years) national forest land in Wisconsin would be less likely to favor limiting snowmobile use than those who used national forest lands for recreation. This proved true on three of the five strategies (Table 3). Apparently, familiarity with national forest lands influences how people feel about management strategies.

Table 3. Differences between visitors to national forest land and nonvisitors in mean intensity of feeling toward five alternatives for managing snowmobile use

Proposed strategies for managing snowmobile use	Mean Scores[1] Visitors (N=124)	Nonvisitors (N=156)
Prohibit all use	1.88	2.22
Set aside areas for no use	.358*	.635
Restrict use to trails or routes	.500	.551
Allow use anywhere in certain areas, both on and off trails	2.69*	2.28
No restrictions on use	3.72*	3.33

[1]Value range from 0 to 4. Value of 0 indicates strong agreement, value of 4 indicates strong disagreement.

*Significant between study groups at .05 level.

SUMMARY AND IMPLICATIONS

This paper compares the feelings of a sample of snowmobilers and the general public toward regulating snowmobiles on public land. Both groups favored restricting snowmobile use. But snowmobilers opposed prohibiting use altogether.

The results illustrate the type of information planners and managers can obtain from the public. For example, by making distinctions among groups, managers can determine those who are interested in an activity and those who lack interest. This judgment should be made with caution, however, because the information people receive affects

their attitudes. Results indicate one-fifth of the nonsnowmobile sample did not feel strongly about prohibiting use. However, this attitude should not necessarily be construed as apathy. At some point they may form more definite opinions toward that particular strategy. Their current feelings may simply reflect a lack of information. For example, as public debate of this issue increases, knowledgeable people (main proponents and antagonists) may take extreme positions. New information (most of which may be propaganda) may be powerful enough to influence public opinion, therefore, it is important to monitor possible changes in attitude over time. Also, it is important for planners and managers to make efforts to inform the public of the rationales, objectives, technical procedures, and likely impacts of management proposals. An informed (educated) public is a prerequisite for useful public involvement in resource planning.

For snowmobilers, affiliation with a recreation-oriented organization did not have a statistically significant influence on feelings toward the various management strategies. This suggests that, in some situations, recreation-oriented organizations can serve as a surrogate source of information that planners and managers could tap without surveying all participants in a given activity.

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INFORMATION NEEDS OF WINTER VISITORS TO THE BACKCOUNTRY

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INTRODUCTION

Winter brings a new world to the mountains of the Northeast. In the White Mountains, Green Mountains and Adirondacks, the cold and snow, intermittent thaws, short days, deeply buried trails and trail markings, combined with the need for special equipment and careful planning, create a special kind of recreational opportunity. People who used to hole-up for the winter and wait for spring are now choosing winter as a time to get out and the mountains as a place to go.

First, downhill skiing, then snowmobiling experienced dramatic growth. Now, cross-country skiing, snowshoeing and winter camping are rapidly gaining adherents. With increased use of backcountry areas come increased responsibilities for backcountry managers. Providing recreationists with the information which they need to assure a safe and enjoyable trip is a major challenge, while the communication resources available to managers are much reduced at this time of year.

STUDY DESIGN AND DEVELOPMENT

This study was designed to determine the perceived information needs of pedestrian backcountry users such as ski-tourers, snowshoers, ice climbers and winter hikers in the White Mountains of New Hampshire, to learn what information resources they used and the problems which they encountered in getting this needed information. This was followed by the implementation and evaluation of one promising technique for providing recreationists with needed information.

The overall methodology is described in a preceding paper, "Participant Profile of Backcountry Recreationists" by Dorothy T. Taylor and Edward L. Spencer.

Briefly, a survey of visitors to backcountry areas was undertaken. Names and addresses of visitors were obtained at trailheads and in backcountry huts and cabins.

Every two weeks from December 19, 1977 to March 20, 1978, questionnaires were sent to a sample of the people whose names and addresses were obtained during the previous two weeks. Three waves of follow-up letters were sent. The overall return was 79% of the mailed questionnaires yielding 902 useable questionnaires for analysis.

The questionnaire was designed to determine the information sought, the sources used and the problems encountered obtaining the information. This was then related to characteristics of the users and their activities. Other research has shown significant differences in the effectiveness of different communication techniques (1). Information needs were categorized in the questionnaire into five groupings. These were weather, trails, safety and emergency procedures, overnight facilities and equipment selection and use. Each grouping had specific topics for which information may have been sought. For example, under weather were listed mountain forecast, conditions above treeline and avalanche danger. A total of 18 potential information needs were listed. Possible sources for information on these topics were then listed across the page horizontally, creating a matrix. Respondents were asked to indicate the specific sources for whichever of the horizontally listed sources they had used.

Although the listing of categories for both information and sources creates a potential bias in the responses, it was a useful technique for an initial study of this breadth, particularly since responses would be coded for computer analysis. The listing of specific sources was hand tabulated to create a reference catalog as well as to document the variety of sources used. There was also an open-ended question asking what information resources the respondent would recommend to an inexperienced friend. This was designed to determine information resources

not included in the matrix as well as to provide an evaluation of the utility of information resources. Several open-ended questions, preceding the matrix, asked what information recreationists had sought, what difficulties had been encountered in obtaining it and whether in retrospect, they wished that they had obtained additional information.

RESULTS

The overall results of this survey showed that respondents in all the activities surveyed sought a great variety of information from a diversity of sources. Despite this, it was possible to group particular kinds of information as being important to particular groups of participants and to identify the sources which were most commonly used.

Weather Information

More people sought information about weather than about any other topic. Fifty-six percent sought general weather information. Only 6% sought information on avalanche danger or conditions above treeline. Technical climbers were more likely to seek this latter information and 84% of them did. Seventy-eight percent of the snowshoers sought weather information but only 56% of the ski-tourers did so. The major sources used were radio, organizations, television and newspapers. Organizations (e.g. Appalachian Mountain Club, US Forest Service) were the major sources of information about avalanche conditions and conditions above treeline. Technical climbers, snowshoers and hikers used organizations as a primary source for weather information while ski-tourers were more likely to get this information from the radio.

Trail Information

This information also was important to backcountry visitors. Fifty-eight percent sought trail information. Forty-five percent sought information on general trail conditions. Smaller numbers looked for specific information such as trail locations, distance, time required and difficulty. Those who were on day trips were more likely to seek this information than those out overnight. Ski-tourers, on what could be characterized as "intermediate" trails, were more likely to seek trail information. Experienced hikers using remore trails were less likely to seek it.

Information about trails was obtained from a broad variety of sources, with publications such as guidebooks and maps being of primary importance. More timely information was obtained from other people and organizations, especially when the data sought was on snow and ice conditions which may change rapidly. Publications and signs were the information sources used most by skiers looking for information on trail length and location. Publications also were the dominant information source for the more experienced participants in all activities.

Other Information

The information in the other categories was not sought out to the same degree as that on weather and trail conditions. Information on facilities was sought by only 10% of the respondents even though 43% of the respondents were on overnight trips. Most of these sought to learn about huts or cabins, others sought to learn about shelters or camping conditions. Information on the location and capacity of facilities was obtained from publications, organizations and from other people.

Information on safety and emergency procedures was obtained primarily from publications. Inexperienced respondents were somewhat less aware of the importance of this information. Equipment information was obtained from publications and equipment stores.

A surprising result was the relatively significant role which equipment stores appeared to play in the transfer of information at several different levels. Twenty-one percent of the respondents had rented equipment, most from equipment stores and 60% had visited stores to obtain some information. It was not surprising that the stores showed up as an important source of information for equipment but they also were cited as a source of information for mountain weather forecasts by 17%, for conditions above treeline by 12%, for information on trail length and location by 11% and for snow and ice conditions by 16%. When responding to the question of what information sources to recommend to an inexperienced friend, over 8% of those who recommended organizations, specified equipment stores. An additional 6% recommended Eastern Mountain Sports in particular. These were exceeded only by recommendations to consult the AMC (12%). In contrast, outing clubs were recommended by only 3% and the US Forest Service, which administers most of the White Mountain area, was cited by less than 1% of the respondents.

Thus, one opportunity which showed promise was to establish an information program at outdoor equipment stores.

CASE STUDY

In the winter of 1978-79, a modest information program was begun cooperatively among the White Mountain National Forest, the Appalachian Mountain Club and several outdoor equipment stores in the Boston metropolitan area and in the White Mountains. Financial, temporal and staffing constraints limited this to a passive display which would provide fundamental informa-

tion and which could be used in a variety of locations. This would be carefully evaluated to determine the effectiveness of this particular technique.

A 2' x 3' poster, silk screened in three colors, was developed, entitled "Winter in the White Mountains". It provided information on four distinct categories: trails and camping, clothing and equipment, cold injuries and the day's weather forecast. Emergency and information phone numbers were also provided. This information was printed over a background map of New Hampshire and the White Mountain National Forest.

A total of 17 posters were distributed. Six were placed in the six equipment stores which had been cited most often in the previous winter's survey as information sources. Three of these were near Boston, MA; the other three were in the White Mountain area. The AMC facilities in Boston and Pinkham Notch, NH also received one poster each. The five USFS District Ranger offices and the Forest Supervisor's office each received one poster and one was placed at the National Park Service Information Center in Boston. The last two were placed at information centers on Interstate 93 between Boston and the White Mountains.

Daily weather conditions and forecasts, which are prepared by the US Weather Bureau in Portland, ME and the Mt. Washington Observatory on the summit of Mt. Washington, NH, were reported by telephone to each of the poster locations each morning and were displayed there for visitors. It was hoped that this timely information would attract customers and visitors to the display, after which they would read the other information provided.

Delays in receiving funding and in designing and printing the poster, as well as an unusually early spring severely limited its utility in 1978-79 and also limited the opportunities for evaluation. This evaluation effort was undertaken, however, and yielded useful data.

The evaluation included collection of both quantitative and qualitative data regarding the observation of the poster and the information gathered from it. Non-interactive observation, questionnaires and interviews were used to collect this data.

During the period of evaluation it was found that in the equipment stores 67% of the customers passing the poster did not notice it. Twenty-six percent glanced at it but did not stop and 8% stopped long enough to read at least a portion of it. Most of those stopping to look at the poster read the weather. Fewer people read the section on winter safety followed by trails, clothing and equipment and the map. The use of the poster varied greatly in the District Ranger's offices. At the office visited by the most winter recreationists, 69% looked at the poster. Most were seeking information on weather followed by trail conditions and cross-country skiing.

A brief questionnaire was distributed to a sample of the people in the equipment stores and information centers to determine how much people had learned from the poster. A total of 967 questionnaires were distributed and 35% were returned. The questionnaire consisted of a brief "test" of backcountry knowledge. All of the answers were available from the poster. Respondents were also asked whether they had seen the poster and what their reaction was to it. Analysis showed that the percent of customers and visitors who had seen the poster varied from 3% at one store to 74% at another one. At six of the locations, those who had seen the poster scored higher on the "test", while at two they scored lower.

Finally, staff at the poster locations were interviewed to obtain their opinions on the usefulness of the posters and on ways in which the posters could be improved. In general, store managers and clerks were enthusiastic about the concept, although they were able to point out shortcomings in design as well. The receptionists at the Forest Service stations also thought that the posters were useful; the assistant rangers were less enthusiastic. At the 17 locations displaying the poster 88% of the staff people interviewed thought that it had been useful to the visitors and staff. The consensus was that the weather forecast was the portion of the display read most. In some cases people would come back on other days to check the weather forecast. Forest Service personnel tended to be satisfied with the colors and format. Store clerks and managers, however, suggested design changes which would make the display more attractive.

CONCLUSIONS

The major conclusion from this survey and case study is that backcountry recreationists use a great variety of information and they obtain it from a very diverse group of sources. Most recreationists go to different sources for different types of information and different people use different sources for the same information. This is exemplified by the 200 different sources cited for weather information and the 100 sources cited for overnight information.

The absence of any widely recognized and utilized information source is striking, particularly considering the fact that the recreation area being used is relatively concentrated geographically and that a large

portion of the visitors come from the Boston metropolitan region. Moreover, a third of the respondents indicated some dissatisfaction with their ability to obtain information.

It is clear that the acquisition of information by backcountry recreationists is a complex communication process which can be demanding for both the manager and the recreationists. First there must be a recognized medium of communication between the manager and the visitor. This can be exceedingly difficult to establish. Moreover, existing communication tends to be unidirectional. Usually a manager is trying to communicate to an undetermined audience from which little or no feedback is received. Because of the many media available for sending out information and the dispersion of the audience, the chances of actually reaching the target audience are extremely small.

There are, however, some media which are recognized by both managers and recreationists as being suitable for communication. There are also some kinds of information which are recognized as being of common interest. A good example of this are the nightly reports of ski conditions which many radio and television stations have for commercial ski areas. Skiers want to know where the skiing conditions are good. Ski area managers want to be able to tell skiers about the conditions at their areas. Thus, it is worthwhile for some commercial enterprise to sponsor the exchange of information at a particular time on a particular station. The communication is undertaken and something is learned.

Backcountry managers and backcountry recreationists in the White Mountains have not established this commonly recognized reservoir of information nor has an effective method of communication been established and recognized. Therefore, there is a random quality to the communication process.

The user is not aware of the existance of accurate sources of information. The manager must try to identify times or places where sufficiently large numbers of recreationists can be, figuratively, accosted so that they can be given the information which the manager wants them to have (2). The pilot study in the equipment stores was a first attempt at doing this. The undertaking reported here was very small and probably did not adequately test the hypothesis. It did show, however, that information can be communicated effectively to the extent that people will begin to recognize these places as a source of useful information and will have a place to come when they seek out information.

It also appears, however, that the percent of those who were actually contacted at an equipment store was relatively small. It is critical and difficult to catch people's attention within the commercial atmosphere of a store with its multitude of highly sophisticated visual stimuli. This is compounded by the fact that the poster was designed to communicate about weather, trail conditions and safety to a group who were in the store to learn about, and perhaps purchase, equipment. Thus, even though the medium was at the right time and place to produce a communication link, it was hampered by misalignment of the stimuli and the message.

Overall, this study has made a start in the anaylsis of communication between managers and recreationists at backcountry areas in winter. It is a complex process but a valuable one. If successful efficient communication programs can be implemented it will increase recreational opportunities, reduce management costs, improve management procedures, improve understanding among managers and recreationists and lead to long-term resource protection.

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THE VERCORS MODEL : CITIZEN INVOLVEMENT IN PLANNING AND PROVIDING CROSS-COUNTRY SKIING OPPORTUNITIES

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More and more urban dwellers are attracted to nature, to rural areas and enjoy outdoor activities. Leaving the cities and finding quiet areas has become everyone's goal. The myths of purity, and of the lost paradise are exacerbated and idealized. Gold mentions that: "Behavioral research indicates one basic cause of the flight to suburbs and flight away from them in our leisure time is a basic desire for contact with vegetation".(1)

Knafou (1978) explains the consequences of this flight towards rural areas. By carrying the structure of urban society over to the rural areas, urban dwellers make it impossible for themselves to find the kind of communication that they seek to establish with the natural environment.(2)

In the last few years the efforts of "sport for all" and physical fitness organisations have revived the inclination towards physical activity in a large number of people.

Winter, which was considered as a formidable obstacle to recreational activity seems to bring new joys and satisfactions with the advent of modern technology. The purity, cleanliness of snow is now an attraction for many people . It suggests peacefulness and relaxation. When one combines physical effort with the discovery of the snow-covered landscape one rediscovers a feeling of harmony with the natural environments.

It might be necessary to struggle against the systematic segregation of sport and culture. There could and should be an overlap between sports and education. Winter activities have the potential for discovering the environment and to develop our knowledge of its various elements. The natural surroundings should be more than a framework for leisure. Winter ski resorts are too often quite artificial. Cross-country skiing, because of the mobility factor gives man more opportunities to discover this feeling of harmony with nature.

Skiing and especially cross-country skiing have both become popular winter activities. In order to provide opportunities for the pursuit of these activities, we need adequate structures to administrate programmes and facilities. In most places we have experienced the concentration model exemplified by winter resorts. Such facilities modify drastically the physical environment. They have too a great social and cultural impact on local populations.

Concern for the quality of the environment caused some planners and developers to believe that concentrated tourist resorts could save the unspoiled quality of the surroundings.(3)

Cohen (1978) mentions that "The importance of the impact of tourism on the environment lies in the fact that it often touches upon the most interesting, most attractive and most valuable parts of the natural, cultural or historical environment of the area... Moreover, the development of intensive modern mass tourism may lead to environmental consequences approximating those of some other industries."(4)

Cultural and social changes with tourism development will occur. "The varieties of cultural and social change that are likely to occur with the advent of tourism are obviously going to affect

the lives of individuals in the host cultures more radically than those of the transient cultures".(5)

It is possible to revamp deserted rural and mountain areas. We need to develop a well articulated plan in order to accomplish this.

Analysis of the impact of tourist development entitles us to say that outdoor activities help the local population become aware of the social and cultural values of their heritage.

In fact leisure and outdoor activities have a relatively strong impact on our natural environment. This impact will be related to the pressure of an urban population which is not well prepared for this contact with the environment. The impact will vary according to the characteristics of the participants (education, motivation, awareness of the environment) and also to their number and density. The impact will also be related to the type of activities, to their intensity, duration and to the concentration that follows. The impact will also be related to the ecology of the leisure, recreation environment. Some environments are very fragile and their destruction can be irreversible or final.

Not only can the natural environment be damaged, so can the socio-cultural environment. When landscapes, behaviors or interests are standardized, diversity is reduced and resistance to their impact is weakened. Ecology teaches us that for the natural and human ecosystems there is a vital need for diversity in order to maintain the richness and balance of the ecosystems. Therefore global planning of a natural environment will include regional and local sites. The approach to planning is a pre-requisite. The approach to planning rests on the principles of "eco-management" of the natural and human environments. Planning will foster diversity and will determine the "carrying-capacity" of recreational and touristic facilities.

Glikson writes: "Today in regional planning we regard the quality of an integrated urban-rural region as an ideal to be regained in the improved environment of densily populated regions, though we cannot restore it in its past forms."(6)

In Western Europe, agriculture on the outskirts of cities presently causes numerous problems such as the parcelling out of farms, the lack of interest of the farmers and the high price of lands. The city has acted as a magnet to attract the rural population. Therefore the countryside is deserted. For the last ten years, the agricultural vocation in the outskirts of the cities has been transformed and these areas are now governed by other objectives. The rural population and the farmers have become responsible for the maintenance of open-space systems, for the hosting and training urban visitors in order for them to understand the area. (7)

Tourism and outdoor recreation represent a promising venture for the local populations. In "Socialisation de la Nature", Philippe Saint-Marc writes "Nowadays the vocation of the rural environment is as much to welcome as it is to nourish".(8)

Through the Natural Regional Park, the farmer has become an expert in the management of his own environment. The conservation of rural areas cannot be achieved without the cooperation of its inhabitants. Nature is not altogether "natural"; landscape is modified by man. The role of the rural is necessary in order to preserve local characteristics and develop their activities by slowing down the deterioration of the rural communities lacking the proper tools as they face these new ventures.(9)

In order to obtain dispersed tourism of light density in the area of outdoor recreation, we will have to supply diversified opportunities for leisure and recreation while conserving the characteristics inherent to the physical environment. A full hospitality structure is needed.

We will try to demonstrate that with a flexible plan and structure, it is possible to achieve coordinated regional development. Process will result from local participation and from a common willingness to include regional amenities and characteristics in the plan.

The Natural Regional Park created in 1966 in France is the vehicule for this type of planning. While presenting the model of Natural Regional Park

of Vercors, we will show how the Park has been the means by which local populations have planned and developed dispersed winter recreation.

What is a Natural Regional Park? What are its goals and objectives?

First of all the large metropolis had to be equiped with natural and recreational zones. This was done in order to create and protect a natural recreational zone. The park was also to have a revival function in the rural areas in order to avoid the exodus and to stimulate the most endangered areas.

The Natural Regional Parks are among the most beautiful areas. Because of their historical, artistic and natural resources, they are most conducive to touristic and cultural development.(10)

The Natural Regional Park has been created to protect nature as well as to provide a living environment for the locals and a relaxing recreational setting for tourists. It is hoped that the locals will be able to maintain local life-styles, working patterns and architecture.(11)

The originality of the Natural Regional Park is attributable to the fact that any request for the recognition of a given area as a natural Regional Park is decided upon by the entire concerned community or communities. To summarize let us say that the Park results from local initiatives.

The objectives of the Natural Retional Park are to contribute regional integration. It is necessary to obtain the full cooperation of the inhabitants and of the representatives of the area. Once the decision is made, they will have to work together to develop a charter describing the goals, objectives and roles of the concerned communities.

The Natural Regional Parks then become rural areas that reflect the work and life-style of many generations. Their objectives are threefold. The first is the conservation of fauna, flora, sites and landscapes. The second pertains to leadership. It is related to the discovery of the natural surroundings, and the environmental education. It also includes knowledge of the cultural and economic history of the area. The third objective is related to advertising and promotion. In this case, the Park wants to develop new formulas of hospitality and tourism in rural or mountainous areas. This form of tourism is dispersed, of light-density and is strongly opposed to human concentration. In this model, tourism and outdoor activities are interrelated.

The Natural Regional Park plan covers an area of thousands of hectares. Its aim is to awaken the enthusiasm of the area. It provides a new meaning and a new source of confidence for the locals. Furthermore it reduces the exodus from the countryside. The Natural Regional Park thus serves as a rural rehabilitation plan. It encourages humanistic goals and proposes to reintroduce the city dwellers to the natural environment.

The Natural Regional Park of Vercors.

Natural Regional Park of Vercors groups 53 communities, for a total of 20 thousands inhabitants. It is situated in the Rhône-Alpes area. Outside the park, but close to its periphery are the cities of Grenoble, Romans, Valence, and Die.

The park was created in 1970. It is a mountainous area, composed of high plateaus, mountains, forests and gorges.

The contrast between the gorges and the high plateaus is beautiful. The natural landscape is, in this region, very diversified.

With these high plateaus, le Vercors is excellent for cross-country skiing. These regions could attract many cross-country skiiers. These outdoor activities could bring economic advantages to the Natural Regional Park. However, some fears have been expressed by local residents who were afraid that their land would be invaded by developers who would build huge ski resorts.

The Natural Regional Park of Vercors, in its Charter has stated its willingness to develop dispersed recreation under the condition that it would foster conservation of the local characteristics as well as a development. The development of cross-country skiing was going to require information about the different sites as well as good activity leadership. The Charter emphasized outdoor recreation activities that are compatible with the natural environment such as cross-country skiing. The Charter promoted dispersed winter recreation which could be beneficial to local populations, especially to those living on the high plateaus.

These objectives are well adjusted to the local situation. The intention was also to revive existing economical activities while integrating new activities such as outdoor recreation and tourism in which both the locals and the inhabitants of surrounding cities could participate.

The Process

It has been necessary to develop the concern for organization and management of outdoor recreation within the communities. This was accomplished through sensitization and training. An association of friends of the Park has been created and this group has exercised some leadership through cooperation with farmers in order to plan and manage the area.

Through participation with the natural Regional Park multi-disciplinary teams, which bring technical support, these natural areas (high plateaus) have been designated for winter recreation and a development plan has been elaborated. The plan aims at the preservation of local diversity and allows local populations to benefit from dispersed recreation economically, culturally and socially.

Activities and programmes

They created an open space system that fosters dispersed recreation, particularly cross-country skiing. The system has been planned according to geographical, ecological, climatic, social and cultural idiosyncracies of the area. Certain trails have been rediscovered while new ones have been mapped out. It is also possible to find food and lodging at various stages along the trails and "table d'hôte" at farms along the way.

Presently there are 20 cross-country skiing hostels on the trails. During the winter season (1980) they offer 30 clinics aimed at the discovery of the natural and human environments. There are also week-ends in the villages with cross-country skiing days on the high plateaus. Each winter inter-hostels rallies are organized.

Both local populations and city dwellers make use of these hostels. School children go cross-country skiing during their physical education classes. At the cross-country skiing hostels, equipment can be rented and instruction can be provided to both beginners and advanced skiiers.

Lodging and accommodation

It has been necessary to set up an accommodation system such as "gîte", "gîte-chambre d'hôte", "gîte-table d'hôte", "relais "gîte rural". The Charter of the Rural "gîtes" of France specifies that "chambre d'hôte" are rooms in private homes that accommodate skiiers and offer overnight accommodation, that is lodging and breakfast. These rooms are not situated on the main roads, but are relatively close to developing touristic recreational areas.

Shelters for cross-country skiiers are found in restored cabins or sheep-folds (bergerie de Châtillon-en-Diois). A multi-purpose accommodation center has been set up at Vassieux-en-Vercors. It offers technical services to skiiers plus food and lodging. It is managed by "Loisirs-Vacances-Tourisme", a national leisure association through the local association of Vassieux.

The lodging and recreational facilities are offered by communities and by individuals. This creates a complementary and diversified service system in the Vercors area.

The training of the rural population

It was necessary to obtain a deep commitment and the participation of the population for the development of the plan. To reach that goal, a training of the rural population was undertaken.

The training of the local population in the trades of tourism (AFRAT) is done in a center where courses are given, workshops are organized around different themes and objectives. There are some training programmes for outdoor activity leadership: outdoor recreation techniques, safety and the relationship between cross-country skiing and the natural and human environments (history, local economics, ecology, landscape, urban planning, accommodation).

The training programmes seeks to enable the local population to operate light-density facilities. Leadership managing and advertising are aimed at increasing the duration of the visitor's stay and at encouraging the use of all the facilities.

Financing

The lodging facilities and the recreational facilities are operated and managed by the concerned communities. Budget comes from subsidies given by the members of the park organization and from subsidies granted by the departments of Agriculture and of the Environment.

The operational costs of dispersed lodging are financed by the Department of Agriculture while the facilities and equipment come from the Secretary of State for Tourism, Youth and Sports.

Forest maintenance is provided by the Office National des Forêts and financed by a joint organization (Syndicat Mixte) composed of Communities, the Departments of Agriculture and Environment, and the Natural Regional Park. There are problems attributable to the scarcity of local resources and to the cost of leadership which increases while the financial subsidies from the State are very limited. For instance in 1978, the total budget for the parks represented 7 Millions French Francs.

Conclusion

Dispersed winter tourism can contribute indirectly to the conservation of the physical and social environment while contributing to the economical development of the region. Winter tourism usually leads to the development of winter resorts, urbanized concentrations of tourists, if the region agrees to develop the structures needed to absorb a maximum of tourists.

The kind of very large-scale and imposing tourism development has been totally rejected by the rural population from the Natural Regional Park and especially the ones living on the plateaus of Vercors. It would have destroyed the very richness they had. The Natural Regional Park is the means by which it has been possible to encourage and to manage dispersed recreation.

When tourists are dispersed on a large area, we need only envision small scale development with minimal impact on local life-style.

Environmental and social side-effects are thus reduced and the area requires only limited transformations.

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THE VISUAL EXPERIENCE IN FORESTS USED FOR DISPERSED WINTER RECREATION

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ABSTRACT

The forest setting used for winter recreation could be made more interesting by managing stands for their spatial qualities. Forest owners in Massachusetts perceived certain stands as more attractive than others. Another study showed that the size of a forest space and the distance seen into a stand in winter varies primarily with the density of undergrowth at eye level. Various silvicultural treatments are suggested that could vary the spatial quality of forest stands along recreational trails.

INTRODUCTION

One important aspect of dispersed winter recreation is the surroundings seen along a trail--the visual part of the experience. How important this is to participants varies to some extent with the individual and with the activity. Yet often when we recall a particularly good day outdoors, the visual impressions of the surroundings are among the most memorable part of the experience.

I will focus on the forest environment and the way trees shape and form the spaces that recreationists pass through. Of the three categories of natural features known to influence scenic quality--landforms, water, and vegetation (Shafer and Brush 1977)--it is the forest vegetation that is most susceptible to change. Mountains, hills, lakes, and streams are relatively permanent, yet forests change in appearance as trees mature and fall, as clearings are cut out of forests, and as open land reverts back to forest.

I contend that much of the visual interest in forests used for recreation is derived from the diversity of forest spaces that are traversed. For recreational activities that require movement, the rate of change and the abruptness of change in forest spaces is the key to visual interest. Prolonged exposure to the same forest conditions can lead to boredom. Where the change in forest spaces is dramatically different from stand to stand, visual interest should be high (Brush 1976).

Much of the diversity in forest spaces is due to site conditions affecting growth such as soil, sun, slope, and moisture, and to natural disturbances such as fire, wind, and infestations. Yet in many locations natural factors alone do not create enough diversity. Wherever woodlands are visually monotonous, silvicultural treatments can create a greater variety of forest spaces to increase visual interest while participating in activities such as snowmobiling, skiing, and snowshoeing. To show how forest management might enhance winter recreation experiences, I will present recent findings from two studies of visual quality in woodlands of Massachusetts.

First let me define forest spaces. Interior spaces or rooms of a building are usually well defined. The shape and size of a space indoors are determined by the walls, the floor, and the ceiling. The boundaries are easy to see. Forest spaces, on the other hand, are vaguely defined: the ceiling is the canopy of branches overhead; the forest floor is often difficult to see through the ferns, saplings, and shrubs in the understory; and the walls are not solid and continuous but trunks of trees and foliage spaced near and far that eventually close off the view in any direction. The size of a forest space is limited by the size and spacing of the tree trunks, and by the foliage at about eye level on branches of trees, shrubs, or saplings.

The presence of snow would affect the attractiveness of forest stands in several ways. Not only is the forest floor uniformly white, but depending on the depth of snow, some of the understory vegetation may be obscured. Also, the observer may be elevated by the snowpack so that more of the canopy foliage blocks the view, making the forest space seem smaller.

To find out whether there are actually perceived differences in scenic quality among various forest spaces, I asked a sample of Massachusetts landowners to rate the attractiveness of 20 different stands (Brush 1979). I photographed stands that differed in the size and spacing of trees, and in the height and density of undergrowth, and included a few clearings with few or no trees.

The photographs were rated on a scale of one to five in order of increasing attractiveness. The ratings were far from unanimous, and even the least attractive of the 20 stands was found to be attractive by 30 percent of the respondents. The results of the survey showed that some groups of stands were significantly different in attractiveness from other groups. Moreover, the stand characteristics of the more attractive stands were unlike the less attractive stands.

All of the people who participated in this survey placed a high value on the esthetic enjoyment and recreational use of their woodlands. All but one engaged in some recreational activity on their forest land, and half of respondents and their families used their woodlands for one or more winter recreation activity:

snowshoeing - 17% snowmobiling - 17%

sledding - 14% cross-country skiing-12%

toboganning - 6% downhill skiing - 5%

The median age of the respondents was between 50 and 60 years, and the median size of ownership was 60 acres.

A close look at the extreme ends of the range of forest sites revealed marked differences. Among the characteristics of the more attractive stands were trees 11.0 inches or more in dbh, clearings, and a sparse understory. The spatial quality of the more attractive sites was open and spacious.

The characteristics of the three least attractive sites were close spacing of small-stemmed trees and limited visual penetration into the stand. Two of these least attractive sites contained dense understory that severely restricted sight distance. The spatial quality of the less attractive sites was generally closed rather than open.

One of the six more attractive stands was a mowed hayfield, a 4-acre clearing bounded by a solid wall of foliage. Three other clearings ranked lower in attractiveness. One was larger, a 15-acre pasture with a few free-standing trees, but it lacked the same sense of enclosure provided by the wall trees. Two other clearings were smaller, only 0.1 acre.

Even though the attractiveness ratings of Massachusetts landowners were based on summer conditions, the results of this study have a bearing on forest management for winter recreation. Although not all of the individual landowners agreed on the attractiveness of a particular stand, they did differentiate one stand from another on attractiveness. Therefore, in managing forests for winter recreation, the key is to plan for a variety of forest stands of different stand structures.

Ten of the 20 stands used in the study contained mostly coniferous vegetation and probably would not change much in relative attractiveness under winter conditions. However, the loss of green foliage in hardwood stands would probably lower their relative attractiveness and make them appear brighter, more open, and more spacious.

Another study in Massachusetts woodlands considered the characteristics of forest vegetation that affect sight distance or visual penetration into a stand (Brush, Williamson, and Fabos 1979). Sight distance determines the size of a forest space, and since this study was done under winter conditions, the findings are relevant to winter recreation sites. After setting up a 6 x 8-foot orange tarp within a stand, an observer backed away until the tarp was no longer visible, and noted the various features in the stand which blocked the view; some of these include the boles of trees and the lower branches of trees, shrubs, and seedlings. The lower branches of conifers such as pine and hemlock provided the most effective screening as did evergreen shrubs such as mountain laurel, and dense

clusters of deciduous shrubs and seedlings without leaves. Wherever such understory vegetation was prevalent, visual penetration into the stand was as little as 40 to 50 yards.

A sight distance of 40 yards encompasses a forest space of about half an acre. In stands where such understory was absent, including conifers as well as hardwoods, and where only the boles of trees blocked the view, visual penetration ranged from 80 to 160 yards. A sight distance of 160 yards encompasses a space of about 5 acres. Thus, depending on the density of trees and understory, the size of forest spaces in the Massachusetts woodlands we tested ranged from 1/2 to 5 acres (Table 1). This study showed that coniferous vegetation was more likely to produce complete screening at shorter distances, but in the absence of understory and low branches, distances in excess of 80 yards were required for complete screening in either hardwoods or conifers.

These findings suggest that forest environments used for winter recreation could provide more visual interest through careful planning and imaginative use of silvicultural treatments. An inventory of forest cover in a recreation area could indicate where a greater diversity of forest spaces is needed. The forest characteristics in such an inventory should include species type, such as pure stands, stands of pure conifers or hardwoods and mixed stands; average diameter; clearings; and the height and density of the understory. Wherever forest conditions appear the same over a large area, consideration should be given to silvicultural treatments that would provide a dramatic change in appearance to break up the monotony.

Of the several silvicultural treatments that could alter forest spaces in winter, some produce immediate results while others require several years to achieve the desired effect.

1. Pruning lower branches to a height above eye level can increase visual penetration into the stand and make the forest space seem larger. The visual effect is immediate.

2. Thinning out trees in overstocked stands can also increase visual penetration and the apparent size of the forest space. This effect is also immediate.

3. Extensive thinning that greatly opens up the forest canopy overhead may stimulate the growth of understory seedlings and shrubs. Over several years the understory could become a visual barrier and appreciably reduce the size of the forest space.

4. Clearing all vegetation from an acre or more produces a dramatic visual change in a closed forest. The effect is immediate but short-lived unless measures are taken to retard regeneration of the forest. Maintaining an open clearing can be costly, but the strong contrast to surrounding forest may be worth the expense.

5. Changing the species in a stand from one forest type to another for visual contrast usually requires considerable time. Where seedlings of pine or hemlock already are in the understory of hardwood stands, for example, the removal of the hardwood overstory will favor the conifers and bring about a type conversion over a period of years. In mixed stands, thinning out undesired species can alter the composition and appearance of a stand.

6. Pure stands of birch, cherry, or pitch pine develop after severe fires of natural origin or after prescribed burns.

The optimal size of a given forest space along a trail depends on the rate of movement. The faster the rate of movement, the greater the distance traversed before boredom sets in. Therefore, forest spaces of a uniform appearance that are traversed more slowly on snowshoes.

Creating a greater diversity of forest spaces and vegetative types would likely result in a greater abundance and diversity of wildlife as well. Nearly half of the Massachusetts forest owners we spoke with mentioned observing wildlife on their woodlands. Any measures to increase the amount of herbs, shrubs, and saplings in a forest will improve the habitat for deer, small mammals, upland birds, and songbirds.

Today, the cost of silvicultural treatments in the Northeast is greatly reduced because of the market for firewood. The small-diameter wood that is removed in thinning and pruning stands now provides a source of income for forest owners. Much of the cost of treating forest land to create more interesting settings for winter recreation can be recovered from the sale of firewood.

TABLE 1

Distance required for complete screening within selected forest stands under winter conditions.

Dominant species	Site no.	Forest type[a]	Principal screening	Screening distance (yards)	
				50%	100%
Oak	18	H3A	Boles	50	160
	17	HS3A	Boles	40	130
	16	HS3A	Boles	50	120
	12	SH4A	Boles	30	90
	8	H4A	Shrubs	40	70
	7	H4A	Shrubs	30	70
White pine	13	S3B	Low bran.	40	100
	11	S4B	Pine saplings	30	90
	10	S4B	Pine saplings	20	80
	6	S2B	Shrubs, low bran.	20	70
	4	S3A	Low bran.	30	60
	2	S3A	Low bran.	20	40
Hemlock	15	SH4A	Boles	30	120
	14	SH4A	Boles	30	120
	9	HS4A	Boles	40	80
	5	SH4A	Boles, low bran.	20	70
	3	HS4A	Low bran.	20	50
	1	HS4A	Low bran.	20	40

[a] Code: S = softwood, H = hardwood, SH or HS = mixed; height class 2 = 21-40 ft., 3 = 41-60 ft., 4 = 61-80 ft.; crown density A = 30=80% closure, B = 81-100% closure.

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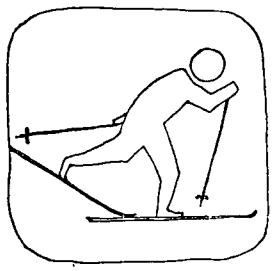

GUIDELINES FOR DEVELOPING SKI TOURING TRAILS

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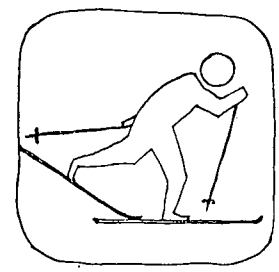


The explosive growth in popularity of ski touring has resulted in a commensurate demand for ski touring trails. While some progress has been made in using existing trails and developing new facilities, the need for adapting existing trails and for developing additional trails continue to grow.

The purpose of this paper is to present some guidelines for planning, design and construction of ski touring trails. The guidelines are based on a publication prepared by the author while planning trails for the State of Wisconsin and also on other available literature as cited in the bibliography. The guidelines are not official standards of the National Park Service. As yet, NPS has not developed standards for ski touring trails.

PLANNING GUIDELINES

Resource Considerations

The single most important consideration in determining an area's suitability for skiing is, of course, adequate snow. While snow making may have some limited applications, it is unlikely to have much impact on the sport. This is due to the high cost of snow making equipment and linear nature of ski touring trails. Trails should be located where there is sufficient snow for 2 to 3 months of skiing. In Colorado, this generally occurs at an elevation above 8000 feet.

The reliability of snow cover can, however, be greatly influenced by the effects of the sun and wind. In general, north facing slopes and wooded areas will retain snow better than south facing slopes and open areas. Observation during a winter prior to construction is the best way to determine suitable and unsuitable areas. Aerial photographs taken after several days of no new snow may be of assistance, as well as discussions with persons familiar with winter conditions in the area.

An area under consideration for ski touring should have variety in terrain. A range from flat to gently rolling to hilly terrain will offer opportunities for a broad range of skiers and improve the experience for all. A misguided assumption on the part of early trail planners was that cross country skiers do not desire steep slopes. As skiers have become more experienced and as more downhillers have begun cross country skiing, the need to have ski touring areas in all types of terrain has increased. If it is not possible to provide a wide variety at one location, the trail planner should attempt to locate separate areas of different terrain types and consider trails at each.

The attractiveness of a ski touring facility is also improved by the incidence of other resource features such as scenery, vegetation, wildlife, geologic formations, historic features and sometimes water. Critical wildlife habitat and vulnerable historic resources should be avoided, however. Trails crossing frozen lakes and rivers should be avoided due to safety hazards and limitations on use.

Avalanche hazards are a major concern in mountainous areas of the West. Avalanches most frequently start on slopes in the 30° to 45° (58% to 100%) range. Open areas in this range that receive large amounts of snow must be avoided when locating ski touring trails. If an avalanche path must be traversed, the safest location is in the runout zone at the bottom. The most dangerous location is in the starting zone since most avalanches involving skiers are triggered by the skiers themselves. In avalance country, trails should be located in heavily wooded areas or on slopes of less than 25° (47%) down the fall line. Conversations with persons familiar with avalanche hazards in the area is well advised.

Retrofitting Existing Trails/Multiple Use

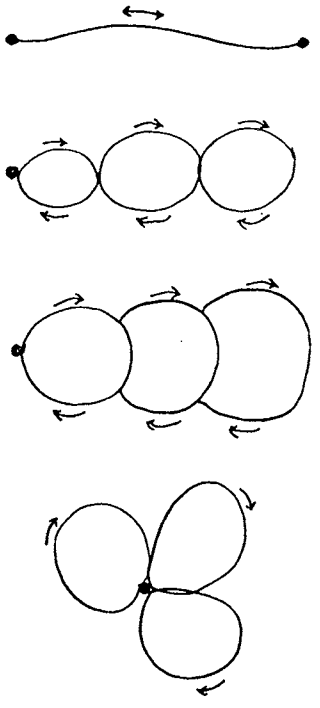
In addition to considering new trails, an inventory of existing facilities should be undertaken. Existing facilities that may have potential for skiing include: hiking trails, horse trails, running trails, bicycle paths, logging roads, fire lanes, old railroad grades, power line rights-of-way and unplowed auto roads.

The advantages of multiple use are obvious. While existing facilities may be used with little or no modifications, the constraints of skiing and the desires of the participants should be considered too. In terms of multiple use, in no case should a ski touring trail be open to snowmobiling. Snowmobiles flatten the double track desired by cross country skiers and they produce undesirable moguls in the path. Moreover, snowmobiles may present a safety hazard and they are an aesthetic intrusion to many cross country skiers.

Developing a Trail System

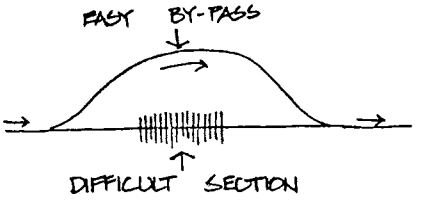
Prior to design and construction of individual trails, it is wise to prepare a general plan for the area. This will improve the chances that future development will fit into current ideas. The plan should consider a spectrum of ski touring opportunities ranging from developed to primitive and easy to difficult.

The trailhead should be strategically located near an all-weather road with sufficient space for parking. Multiple trailheads may be necessary in some areas.



TRAIL CONFIGURATION CONCEPTS

It has been this author's experience that a typical skier travels at about 5 km per hour (3.2 mph) on gentle terrain and desires about 2 to 4 hours of skiing in a day. Therefore, a trail system should provide 15 km or more of skiing, if possible. Trails may be "point-to-point" or, more desirably, in a loop pattern. A loop system allows for one-way travel which enhances the impression of solitude, and the skier avoids traversing the same path twice. Rather than one long loop, it is better to have a series of interconnecting loops providing a greater freedom of choice to the skier. Once again, loops can be designed at different levels of difficulty. In some cases, it may be appropriate to have an optional easy by-pass to go around a difficult section of trail.



Aesthetics in Trail Planning

While functional needs place limitations on trail planning, there is a tremendous opportunity for maximizing the aesthetic quality of a trail. The overriding principle in trail aesthetics is to provide visual variety. Enclosed areas may be alternated with open areas. The trail can be routed to take advantage of views, vistas and points of interest. These opportunities may be seen from a variety of vantage points. Contrasts to the dominant landscape character are encouraged. Change will hold the interest of the skier.

The trail planner should consider the winter landscape. Deciduous plants shed their leaves, color becomes less dominant and form and line are accentuated. Contrast (light and dark) is increased by the presence of snow cover. Water is less important if streams and lakes are frozen, but if open, they can be even more impressive.

Ski Touring Interpretive Trails

Most ski touring trails will have some potential for interpretation. If the experience is deemed appropriate through the trails plan, it may be desirable to develop a trail specifically for interpretation. An interpretive trail is distinguished from any other trail in that along its course interpretive messages are provided to the visitor through written material or by an interpretive guide.

Interpretive trails should be wider and shorter than general use trails. Visitors will make numerous stops, increasing the travel time. Cold weather may inhibit the desire for extended interpretive experiences. The trail should be kept on gentle terrain so that skiers of all abilities may use it. The assistance of a person with experience in interpretation is recommended for interpretive trail planning and design.

Site Reconnaissance

U.S. Geological Survey or other suitable topographic maps should be acquired for the study area. If available, aerial photographs may also prove to be quite useful. An overflight may be desirable for large or remote areas. While grades can be roughly calculated from topo maps, a clinometer or an Abney level will provide more accurate measurements in the field. A compass is a necessity in most cases, and a thermometer may be useful for locating warm and cool areas.

Possible trail corridors should be roughed out on the base map to assist on-the-ground reconnaissance. The corridors should then be hiked and, if possible, skied. In addition to winter surveys, the best time for field work is in the fall after the leaves have dropped. The trail planner should make note of grades, soil conditions, potential hazards, exposed areas, avalanche danger, existing facilities, opportunities for interesting views or vistas and any other significant features. These should be mapped if possible.

If the trail planner is not an experienced cross country skier, the assistance of an experienced skier is advised for this and other phases of trail development. Often local ski touring or mountain clubs will have persons experienced in trail design whose expertise will prove invaluable.

DESIGN GUIDELINES

Difficulty Ratings

Any one ski touring trail should be designed for a given level of difficulty; while the trail system should provide a variety of difficulty levels. Ski trails should be rated using the nomenclature of downhill ski runs which has wide recognition:

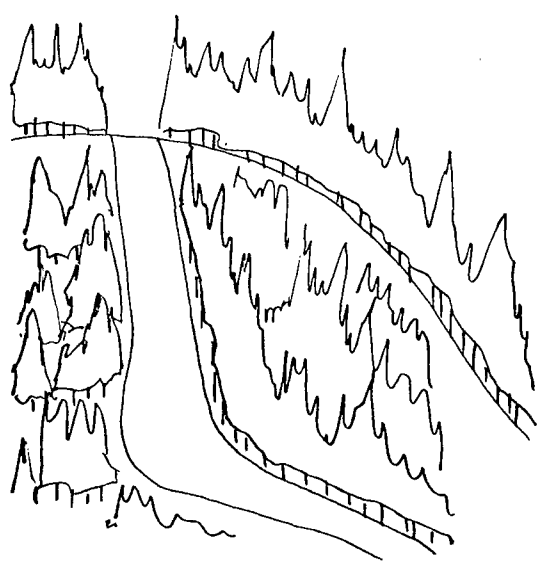
1. Easy - for beginners and general use. Slopes are gentle, generally less than 10% (10 foot rise in a 100 foot horizontal). Clearance and turns on slopes are wide and sweeping, allowing the skier to snowplow. Sections on hills are generally straight, of short duration, and visibly is always good. Steep uphill sections should be avoided, even if of short duration. The trail surface should be smooth and flat. Easy trails are often relatively short in length (2-5 km).

2. More difficult - for intermediate level skiers. Slopes are moderate with maximums up to about 40% for a short run. Clearance and turns should be adequate for snowplowing steeper sections. Segments on hills are usually straight or with sweeping turns. Generous use of turnouts and runouts is suggested. The trail surface may have some uneveness on slopes. Intermediate trails may be longer than easy trails.

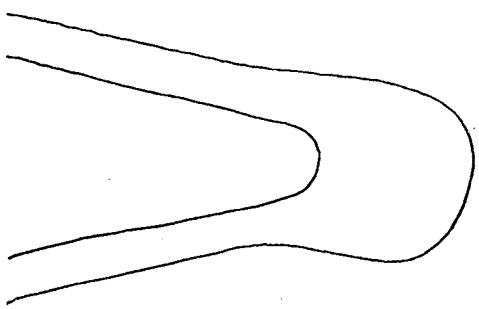
3. Most difficult - for advanced skiers. The major constraint (as with other trails) is safety. Short downhill runs may be in the 40% to 70% range. However, due to the limits on ski control (even for experts), steep slopes should be wide and straight or have sweeping turns. Turnouts and runouts are also recommended for steep sections. While the trail may have bumps and irregularities, these should not make skiing uncomfortable or dangerous. Most difficult trails may be longer than intermediate trails.

Turnouts and Runouts

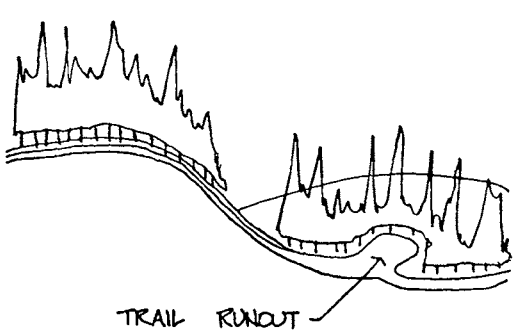
A "turnout" is a widened area or "check space" in midslope of a downhill run that provides space for a skier to regain control.



These should be provided on a long downhill run or on the outside of a downhill curve to allow skiers to stop if necessary. A "runout" is an area at the bottom of a downhill run providing space for a skier to slow down or stop before continuing. Runouts are advised for steep slopes that end by curving off in one direction or another. Switchbacks should be avoided if possible. If necessary, extra space should be provided at the turn. Sharp bends at the bottom of long steep grades should also be avoided. An especially effective technique is to position the runout on a gradual uphill segment which facilitates regaining control.



The amount of space to be cleared for turnouts and runouts is established in the field. It will be determined by the grade, length of slopes, sharpness of turns and desired difficulty of the trail.



Alignment

Since ski touring is a recreational activity, the most desirable path between two points is not a straight line. Trails should be curvilinear, fitting into the landscape. However, sinuous alignments should be avoided as they encourage shortcutting and may interfere with the skiers kick and glide motion. A curvilinear path also increases the carrying capacity of a trail since sightings of other ski parties are minimized. However, occasional straight sections may be included for variety and to provide opportunities for exercise.

Due to the length of cross country skis, the speed of travel and skiing rhythum, the minimum turning radius is greater on the flat than for hiking trails, and it increases dramatically on downhill runs. A general guideline for minimum turning radii on flat terrain is about 5 m. On uphill sections, the skiers motion is reduced to a walk. However, turning radii are still somewhat greater than for hiking trails due to the length of skis and reduced stability.

Trail Width and Clearance

While the absolute minimum width necessary for skiing is about 1 m, a width of 2 m is recommended for freedom of movement and passing space. The minimum width should be increased to 3 m on slopes to allow for snowplowing down and herringbone or sidestepping up. The sections demanding this wider clearance will be dependent on the grade, length of slope and desired difficulty level for the trail.

While two-way trails should be minimized, when they are necessary and heavily used, a width of 3 m is recommended to allow for a double track. The wider trail has the added benefit of accommodating vehicles for trail maintenance during the off-season, if desired. However, the trail designer should be cautioned against excessive widths that eliminate the "trail" effect, especially in primitive areas.

Obstructions should be cleared to a height of 3 m above the average snow depth allowing for the effect of snow-laden boughs.

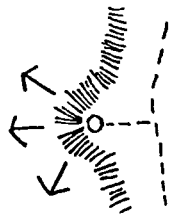
Trail Layout

After site reconnaissance and finalizing of trail corridors in a trail plan, the precise location of a trail is established in the field. The designer walks the proposed route and determines the most ideal path. Areas requiring substantial clearing and grading should be avoided if impacts are to be minimized and costs kept low. The terrain is more intensively studied to assess slopes and minor features affecting trail location. If possible, ski trails should travel straight down the fall line on a slope. Multi-use trails often must traverse slopes for erosion control. If so, the trail may need grading to provide a level tread. Trail intersections should be located in flat areas where possible.

Trails should be routed to take advantage of vegetation. Evergreens on the south side of a trail will screen the melting effects of the

sun. However, on the north side, they may intensify the sun's impact.

Another factor affecting actual location of the trail is access to rest areas, campsites, picnic tables and points of interest. Many people feel that a trail should be laid out to pass by these points rather than through them. Short spurs off the main path can provide access. In this manner a choice is provided to the skier, and persons using the points will not be unduly disturbed.



POINT OF INTEREST ACCESS CONCEPT

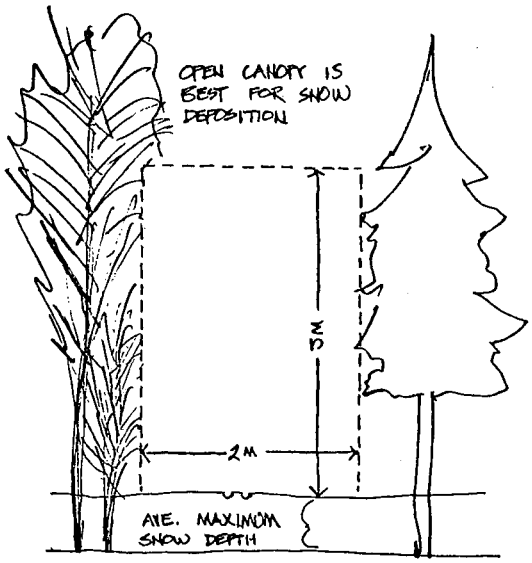
Once trail alignment is determined, it can be marked using flagging ribbon tied to centerline stakes or existing vegetation. One flag should always be visible from the next. These, along with typical cross-sections and general specifications are normally adequate for the construction crew.

CONSTRUCTION GUIDELINES

Trail construction may be accomplished with volunteers, by in-house labor or with a trail construction contractor. Construction equipment can range from simple hand tools to mechanized trailbuilders. Following are some general guidelines for getting ski trails operational. For a more complete treatment of trail construction, refer to the "AMC Field Guide to Trail Building and Maintenance."

Clearing

Trail construction is best accomplished in early autumn after the leaves have dropped. Vegetation should be cleared to the dimensions outlined above. Larger healthy trees should be left standing if possible. Cut brush and stumps to ground level or remove them. Branches should be cut at the tree trunk or main limb. Remove dead or dying trees that may fall into the trail. Remove rocks, or cover them with soil. Debris should be deposited on the inside of curves on slopes. While these guidelines may be adjusted for expected snowfall, a smooth tread will extend the season and minimize skier complaints.

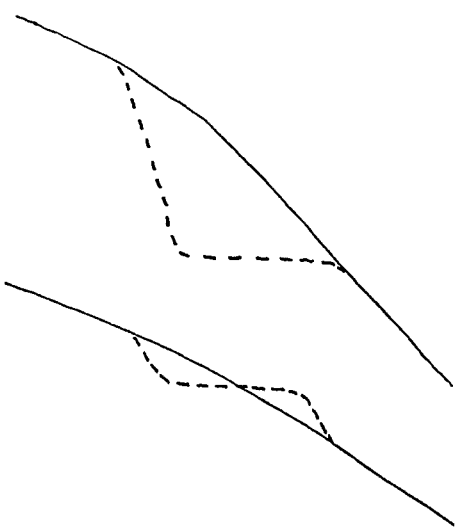


Surface Materials

If the trail is to be used exclusively for ski touring, a sod cover is the best surface. Hiking/skiing trails should be routed to take advantage of suitable soils. Paved surfaces are not acceptable because snow melts more quickly and ski bottoms can be damaged.

Grading

Extensive grading should be minimized to avoid adverse impacts and keep costs down. It may be advisable to test trails for a ski season before extensive construction is undertaken.



SIDESLOPE TRAIL CONSTRUCTION

Grading may be required on trails traversing slopes to provide a level tread. The tread can be established by balancing cut and fill or building up materials on moderate side slopes. It should be cut entirely into the hill on steeper slopes according to local soil conditions and use constraints. Built-up areas may not withstand multi-purpose use.

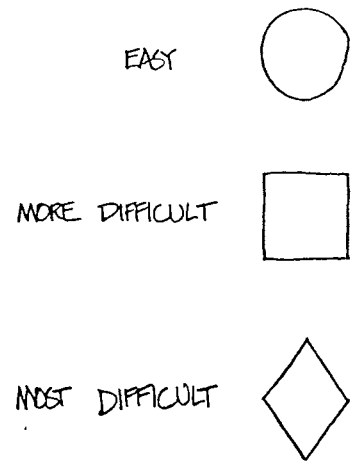
Drainage

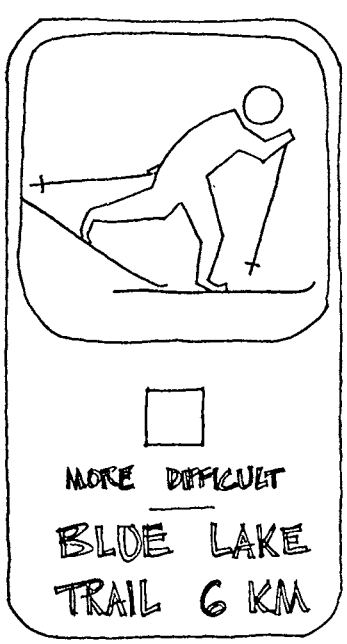
To avoid pooling and erosion problems, proper drainage must be established. The tread can be cross-sloped slightly to assist drainage. Grade dips may be employed where necessary to divert water from the trail. They should not be so abrupt as to spill a skier. However, if properly designed and constructed to produce a rolling effect, they can add to the thrill of a downhill run.

Signing

Where trails are occasionally obscured by heavy snow or hard to follow due to misleading tracks, reassurance markers may be employed to define the path. While there is no universally accepted marker, a standard symbol such as the ski touring symbol should be used throughout an area. These should be positioned just below eye level allowing for average maximum snow depths. They are displayed on posts or trees (if they will not be damaged).

The trailhead sign identifies the trail's function (using the symbol for ski touring), the trail's name and the difficulty level. The difficulty should be displayed using the generally recognized symbols employed in downhill ski areas: a circle for easy; a square for more difficult; and a diamond for most difficult. A trailhead sign may also include information on trail lengths, configuration and points of interest.





STRUCTURES AND SUPPORT FACILITIES

Structures

Due to the nature of the sport and desire to keep costs down, structures should be kept to the minimum necessary. Design should be complementary to the setting using native materials where possible. The number and type of structures should be commensurate with the experience desired ranging in the opportunity spectrum from developed to primitive.

An absolute minimum width for ski trail bridges is about 1 m, however a 2 m width is better for safety and manuverability. Provide handrails in hazardous situations keeping in mind the reduced stability of a skier. Allow for average maximum snow depths in establishing rail heights. Approaches to bridges should be conducive to controlled crossings (i.e., no steep grades). While bridges may not be necessary on small streams that freeze over, wet skis make gliding very difficult when ice forms on ski bottoms.

Support Facilities

Trailhead parking will be required according to demand and desired use levels. In remote areas, extra plowed space along the side of the road may be sufficient. A rough guide might be 2 spaces per kilometer of trail for moderate use trails. Provision for bus parking is advised for moderate and heavy use areas. An adjacent grass field can be plowed for overflow parking during peak use periods. Toilets are recommended for popular trailheads and warming shelters will be appreciated by most skiers.

RESEARCH NEEDS

These guidelines were developed from personal experience and the available literature. To this author's knowledge, no empirical research has been done to test the notions currently in print. It is suggested that existing trails and user preferences be studied to provide a more substantive basis to guidelines for developing ski touring trails.

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SKI TOURING TRAILS: Planning Trails for Visual Enjoyment.

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Abstract.

What recreational skiers view from trails becomes their image of the countryside. Images of visual events can be reduced to basic elemental components and sketched. The visual sequence along a trail can be graphically represented with a series of sketches. Several trails represented the same way could be compared and their scenic quality rated.

Introduction.

The visual part of skiing maybe the major source of information and enjoyment. Visual information helps coordinate movement. Visual enjoyment helps form experiences that are memorable and important to recreation. Trails and their surroundings are viewed and become skiers' images of the countryside. A skier will probably judge the countryside dull or interesting based on these images.

VISUAL NOTATION METHOD.

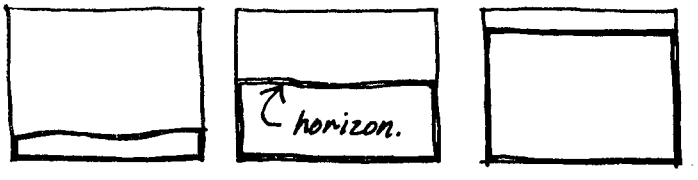
In a forest environment, images are based on natural features influencing scenic quality---- landforms, water, and vegetation. (Shafer and Brush 1977). These features shape and form outdoor spaces, that in turn, can be categorized into types--enclosed, canopied, panoramic, and others (Litton 1972). Even with outdoor spaces typed, a skier has little capacity to change them. What a skier or trail planner can change is a course of travel or location of a trail. In other words, the relationship between skier and landscape.

A skier could be on top of, on the side of, or on the bottom of a landform. Distances between a skier and landscape features could be changed. The succession or sequence of travel or a trail could be manipulated or designed in ways that would cause a change in point of view, an abrupt or subtle change in landscape space. An infinite number of relationships are possible. (Thiel 1961 and Litton 1972)

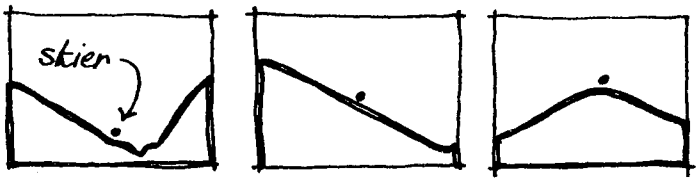
A skier moving through a landscape is complex and not a simple or disconnected phenomenon. Similiarly, the designing of trails requires many considerations in addition to possible visual landscape images. But, seemingly, these images are important to the skiing experience. So, how could visual landscape images be predicted with some clarity; and at the same time be integrated with all other trail designing considerations?

I reviewed several sequence notation methods of architects, landscape architects, and planners, in an effort to learn a method for plan- visual sequence of ski touring trails. Their methods were either representational, abstract, or symbolical. Representational methods like photography were probably the most accurate; symbolical methods were reduced such a minimum that made them the most difficult to learn and understand. But some degree of abstraction seemed to describe a visual message and was simple and easy to excute. Common to all was the identification and use of basic visual elements. I am proposing a method that illustrates basic visual elements applied to winter landscapes and ski touring trails.

Seemingly, two notations are needed to represent a landscape with a skier; the view from the trail and ski position. Since we see in elevation, sketches representing basic elements are in elevation. The view from the trail is related to skier position. The skier is on top, on the side or on the bottom of the landform; so the apparent horizon line is near the bottom, middle or the top of an elevational sketch. A cross section of the landscape is sketched with the position of a skier indicated.



ELEVATION SKETCHES.

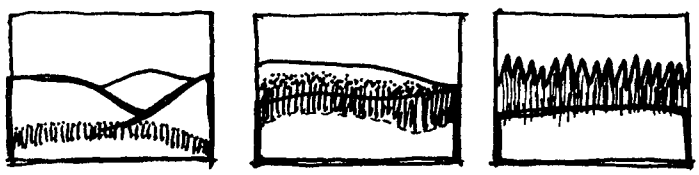


CROSS SECTION SKETCHES.

For canopied landscapes an abstraction of trees is added to indicate the size of forest spaces. Sapling stands are drawn with thin, numberous vertical lines; similiarly, older, more mature stands are drawn with thick, more sparse vertical lines and so on. An indication of branching structure and conifer foliage are added as needed.

FOREST SPACE SKETCHES.

For panoramic landscapes, a simple indication of the way the landform folds maybe all that is necessary. Enclosed landscapes are drawn with lines indicating the character of a vegetative wall or rock facing.



FOREST SPACE SKETCHES.

Then the sketches combined in the order seen on the trail or proposed trail alignment. Scenes could be sketched when changes occur with the landscape or at specified intervals.

APPLICATION

I applied this notation method to a forest trail on the Green Mountain National Forest. I used a complimentary narrative to support the sketches. The trail was judged as having variety, as forest types are varied; landscape are canopied, enclosed and panoramic. A skier is in contrasting positions on a valley bottom or ascending to a ridge.

Trail Narrative.

Trail Segment Number.

1. Entering from the highway, a skier is on the bottom of a valley with steep side slopes and near a brook. An uneven-aged mixed forest with hemlock is on both sides.
2. A skier, on the valley bottom, climbs along the brook, southerly through a medium dense desiduous stand;
3. through a very dense desiduous stand.
4. Near the top of the climb and in a shallow valley, skier approaches and enters a spruce stand.
5. Traversing downhill and northerly, in continuous spruce stand.
6. Contouring along a knoll and at the edge of the spruce stand and a recently thinned mixed desiduous stand.
7. the same stands with landform sloping steep-away from trail afford views of the hills and valleys of the drainage.
8. Downhill and on a ridge line.
9 & 10. A large clearing, and an offering of vistas of a larger panoramic landscape.
11. Traversing downhill in a tinned even aged stand.
2 & 1. and returning along a brook and on the bottom of a vee-shaped valley.

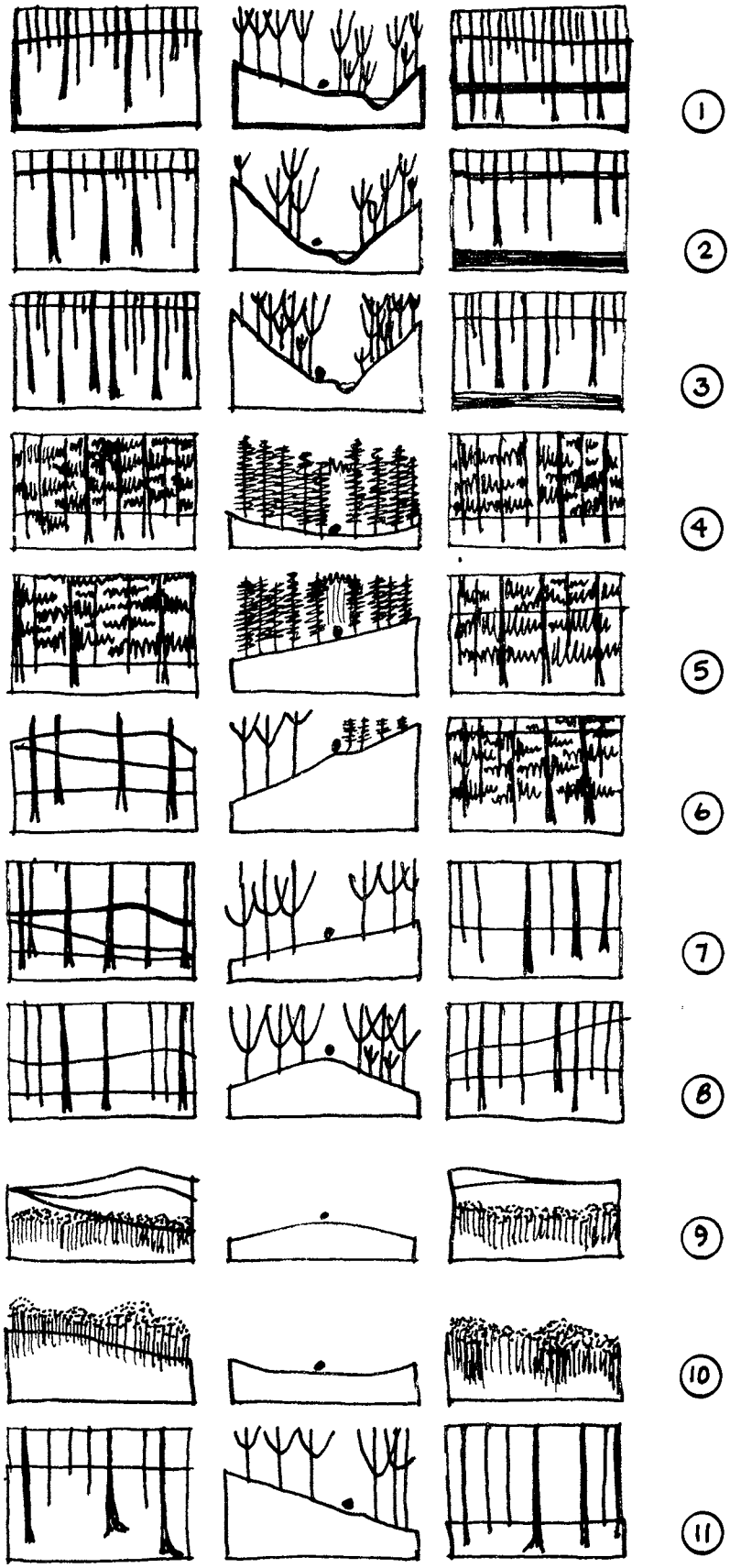
Visual Sequence Sketches and Plan. See next page.

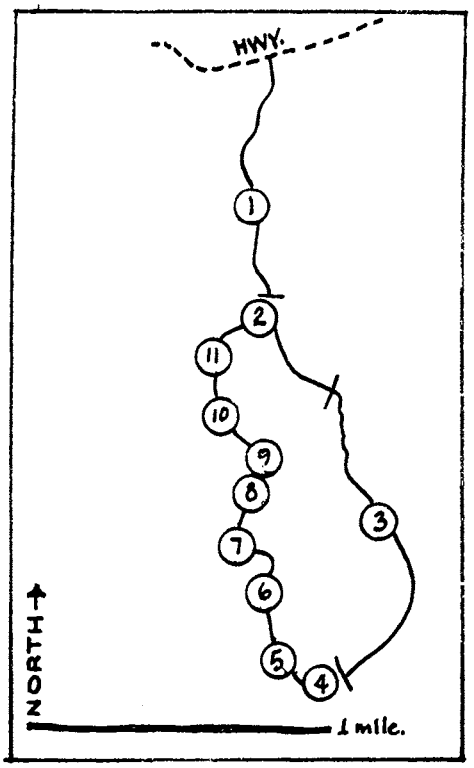
Summary.

If the completed overview of a trails visual sequence showed a need for more visual variety alternative manipulations could be tried. If a trail was always on the bottom of a landform, maybe it could be routed up to and along a ridge. If it was shown a trail always in a canopied landscape, maybe it could be routed through an enclosed forest opening or to a vista point for a panoramic view. Or maybe the vegetation could be treated with thinning or removal creating an opening.

The completed visual sequence overview could be used several ways. Simply, as a trail planner's tool to increase variety and interest. It could be used as a visual aid at ski club meetings for planning events. In the case of public lands, several alternatives could be presented for public and land manager rating and chosing a preferred alternative.

This work doesn't present a finalized or proven process, but demonstrates that a simple notation method could be identified and applied. Try the method and plan for visual values!





Visual Sequence Sketches and Plan

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CROSS COUNTRY SKIERS AT TAHOE DOWNHILL RESORTS

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Cross country skiers have been compared to participants in other kinds of dispersed winter recreation (Knopp and Tyger 1973) but, until recently, no studies have been published which compare cross country and downhill skiers. Based on a nationwide telephone survey conducted in 1978, LaPage (1980) reports that about 69% of all active skiers in the United States skied downhill only, 13% skied cross country only, and 18% skied both downhill and cross country in that year. The fact that a greater proportion of active skiers skied both downhill and cross country than skied only cross country makes it clear that the two types of skiing are not necessarily mutually exclusive.

A better understanding of the similarities and differences among cross country skiers, downhill skiers, and those who do both could help planners and managers minimize conflicts and maximize benefits experienced. This is particularly true for parts of the country where both of these activities are growing in popularity and the resource base for future development is limited.

The Lake Tahoe region of California and Nevada had 26 operating downhill ski resorts in 1978. Several of these had cross country ski trail developments located within the resort or nearby. An exploratory, on site study was undertaken in 1978 and 1979 to compare cross country, downhill, and combination skiers in this region on selected characteristics and motivations for skiing.

METHODS

During January, February, and March of 1978, skiers, 16 years of age and older, were sampled at 8 Tahoe area alpine resorts situated in California and Nevada. A random sampling procedure was used in which respondents were selected at ski lifts for interviews at a convenient location later in the day. Sampled skiers, who consented, were also sent a mail questionnaire containing the following three questions pertaining to cross country skiing:

Have you done any cross country skiing during the last 12 months?

Have you done any cross country skiing prior to the last 12 months?

Do you plan to do any cross country skiing during the coming year?

Usable mail questionnaires were returned by 49% of the 708 respondents interviewed. Answers to the above questions made it possible to split this portion of the original sample into two groups for purposes of comparison. Respondents answering "yes" to any or all of these three questions were grouped together as combination alpine/nordic skiers. The remaining skiers, who had never skied cross country and did not plan to, were termed alpine purists. This grouping admittedly overestimates the actual proportion that did both cross country (nordic) skiing and alpine (downhill) skiing. There were, undoubtedly, a small number classified into this group who had dropped out of nordic skiing or who indicated they planned to ski cross country in the coming year but did not in fact do so. Eighty respondents to the 1978 mail survey were sampled at one California alpine resort with a nordic trail development.

Nordic skiers were sampled at the resort from February 25 through April 1, 1979. Questionnaires were distributed to a systematic random sample of groups registering at the touring center. One member of each group, 16 years or

[1]The survey of alpine skiers (1978) was conducted in cooperation with Dr. John McNeely, Agricultural and Resource Economics and Richard Masse, Division of Renewable Natural Resources at the University of Nevada, Reno, Nevada. The research was part of the Regional Research Project W-133, Determinants of Choice in Outdoor Recreation. Martha Mangan, student intern, U.C. Santa Barbara, conducted the field portion of the 1979 survey of nordic skiers.

older, was selected at random to complete the questionnaire. Seventy percent of the questionnaires distributed were returned, for a total of 85 respondents.

Nordic respondents were asked the same three questions as above, but reworded to assess their past, present, and future participation in downhill skiing. Responses to these questions were combined to split the nordic skier sample into two groups. Respondents who answered yes to any or all of the questions indicating participation or intention to participate in downhill skiing were grouped together as combination nordic/alpine skiers. The remaining cross country respondents who had never skied downhill and did not plan to were termed nordic purists.

Analysis involved exploration of differences and similarities among purists and combination skiers as defined for both the 1978 and 1979 samples. It is assumed that the fact the two samples were drawn in two different years and in a somewhat different manner did not materially affect the results of this study.

RESULTS

Alpine purists accounted for 69% of the skiers sampled at the 8 Tahoe resorts in 1978. The alpine/nordic combination skiers accounted for 31%. However, some unexplained differences were found for proportions of the two groups visiting California as opposed to Nevada resorts. Only 27% of the total were combination alpine/nordic skiers, at the alpine resorts situated in California. This increased to 35% for one of the resorts which was situated half in California and half in Nevada, and increased again to 42% for Nevada resorts (see Table 1).

Table 1. Comparison Proportions of Alpine Purists and Combination Alpine/Nordic Skiers at California and Nevada Resorts (1978).

Resort Location	Alpine Purists	Alpine/ Nordic	All Skiers
California	73%	27%	(n=240)
Stateline	65%	35%	(n=49)
Nevada	58%	42%	(n=59)
Total Sample	69% (n=241)	31% (n=107)	100% (n=348)

The 1979 sample of cross country skiers consisted of proportionately more combination skiers than nordic purists, something which could have, perhaps, been anticipated for a cross country area situated within a downhill resort. Sixty-six percent of this sample were nordic/alpine skiers and only 34% were nordic purists. The portion of the 1978 downhill sample drawn at this same resort and used for comparison to the cross country sample was composed of 77% alpine purists and 23% combination alpine/nordic skiers.

The 1979 cross country sample is compared to the 1978 downhill sample at the same resort. In contrast to the 1978 sample, the 1979 sample was composed of a majority of women and was, on the average, somewhat older, more highly educated, and of higher occupational status. Since the two samples were taken in different years, these results can only be considered indications of real differences which might be found between cross country and downhill skiers (see Table 2).

Table 2. Apparent Demographic Differences Between Alpine (1978) and Nordic (1979) Skiers Sampled at the Same Resort.

Items	1978 Alpine Sample	1979 Nordic Sample
Sex:		
Female	38%	58%
Male	62%	42%
	100% (n=79)	100% (n=85)
Age:		
16 to 19 yrs.	9%	3%
20 to 29 yrs.	31%	29%
30 to 39 yrs.	35%	35%
40 yrs. & over	23%	33%
	100% (n=78)	100% (n=85)
Education:		
High School and Less	15%	6%
Some College	33%	25%
College Degree	33%	26%
Graduate School	19%	43%
	100% (n=78)	100% (n=84)
Occupational Status:		
Higher[a]	42%	66%
Lower[a]	58%	34%
	100% (n=79)	100% (n=84)

[a]Higher occupational status was defined by lumping together professional, technical, managerial, and administrative occupations. All other occupations were grouped as lower status.

Chi square tests were performed for each of the two samples to determine whether there were any significant differences between alpine purists and combination alpine/nordic skiers, or between nordic purists and combination nordic/alpine skiers with respect to any of these characteristics. No differences were found.

Motivations for Skiing

To assess motivations, skiers in both samples were asked to rate twenty-three items on a five point scale as to the importance each represented for their "successful skiing day." Using rankings of the twenty-three items derived from item means, the four skier groups are compared (Figure 1). Where more than one item had the same mean, an average rank was assigned to each tied item.

The twenty-three items in Figure 1 represent operational measures of four levels of human needs specified in the theory of motivation developed by Abraham Maslow (1970). The operational development of these motivation measures is reported elsewhere by Mills (1979). Items which consistently ranked lower than sixteen were judged to be relatively unimportant measures of motivation for all skiers sampled and thus were not used for comparison of the skier groups. Following are descriptions of the four Maslow needs operationalized, together with symbols used to designate each in Figure 1:[2]

△ △ △ Self-actualization

◇ ◇ ◇ Esteem

○ ○ ○ Affiliation

□ □ □ Safety

The three items indicated by the open triangle symbol represents an aesthetic component of the self-actualization need, as opposed to six items representing other components.[3] The two items indicated by the circle represent a companionship component of the affiliation need, as opposed to four items representing two other components of this need.[4] By definition the self-actualization need denotes a self-centered orientation, and the affiliation need denotes a not self-centered orientation. In contrast, the esteem and safety needs may denote both self-centered and not self-centered orientations. The items used for comparison of skier groups on these two needs represent self-centered measures of each.[5]

When the items designated by symbols for each of the four Maslow needs are compared by mean rankings across skier groups, differences in relative importance of the four needs are apparent. For each need, the one item which appeared to vary most was selected to explore the significance of apparent differences.

Among pure alpine skiers, the esteem need item, BECOMING BETTER AT SKIING, had a mean importance rating significantly higher than both the safety need item, IMPROVING PHYSICAL HEALTH ($p<.01$), and the self-actualization need item, VIEWS OF SPECTACULAR SCENERY ($p<.001$). The mean of the affiliation need item, COMPANIONSHIP OF A FRIEND OR FAMILY MEMBER, did not differ significantly from that of BECOMING BETTER AT SKIING, but it was significantly higher than either IMPROVING PHYSICAL HEALTH ($p<.05$) or VIEWS OF SPECTACULAR SCENERY ($p<.05$).

Among combination alpine/nordic skiers, the mean rank of BECOMING BETTER AT SKIING was lower ($p<.10$) than that of COMPANIONSHIP OF A FRIEND OR FAMILY MEMBER and was not significantly higher than either IMPROVING PHYSICAL HEALTH or VIEWS OF SPECTACULAR SCENERY. However, as with the alpine purists, COMPANIONSHIP OF A FRIEND OR FAMILY MEMBER again had a significantly higher mean importance rank than both these items ($p<.05$; $p<.01$).

Among combination nordic/alpine skiers, BECOMING BETTER AT SKIING had a mean importance rank which was significantly lower ($p<.01$) than any of the other three item means being compared.

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[2]Twelve of the 23 items in Figure 1 were acquired from an item pool developed by Dr. Beverly Driver, U.S.D.A. Rocky Mountain Forest Experiment Station, in cooperation with Dr. Perry Brown, Oregon State University. Their assistance in making these items available to us is gratefully acknowledged.

[3]Figure 1 items representing the other components of self-actualization are: to experience feelings of freedom, exhilaration, ecstacy, and creative accomplishment, to experience solitude, and harmonious development of mind and body.

[4]A family togetherness component of affiliation is represented by two items: the day's contribution to family harmony, and doing something together with the family. A teaching/sharing skills component is represented by two other items: to share my skills and knowledge with others, and helping others improve their skiing technique.

[5]Figure 1 not self-centered measures of safety need represent a security element: considerate behavior of skiers here, and respectfulness of skiers for one another here. The not self-centered measure of the esteem need is: informal competition with friends.

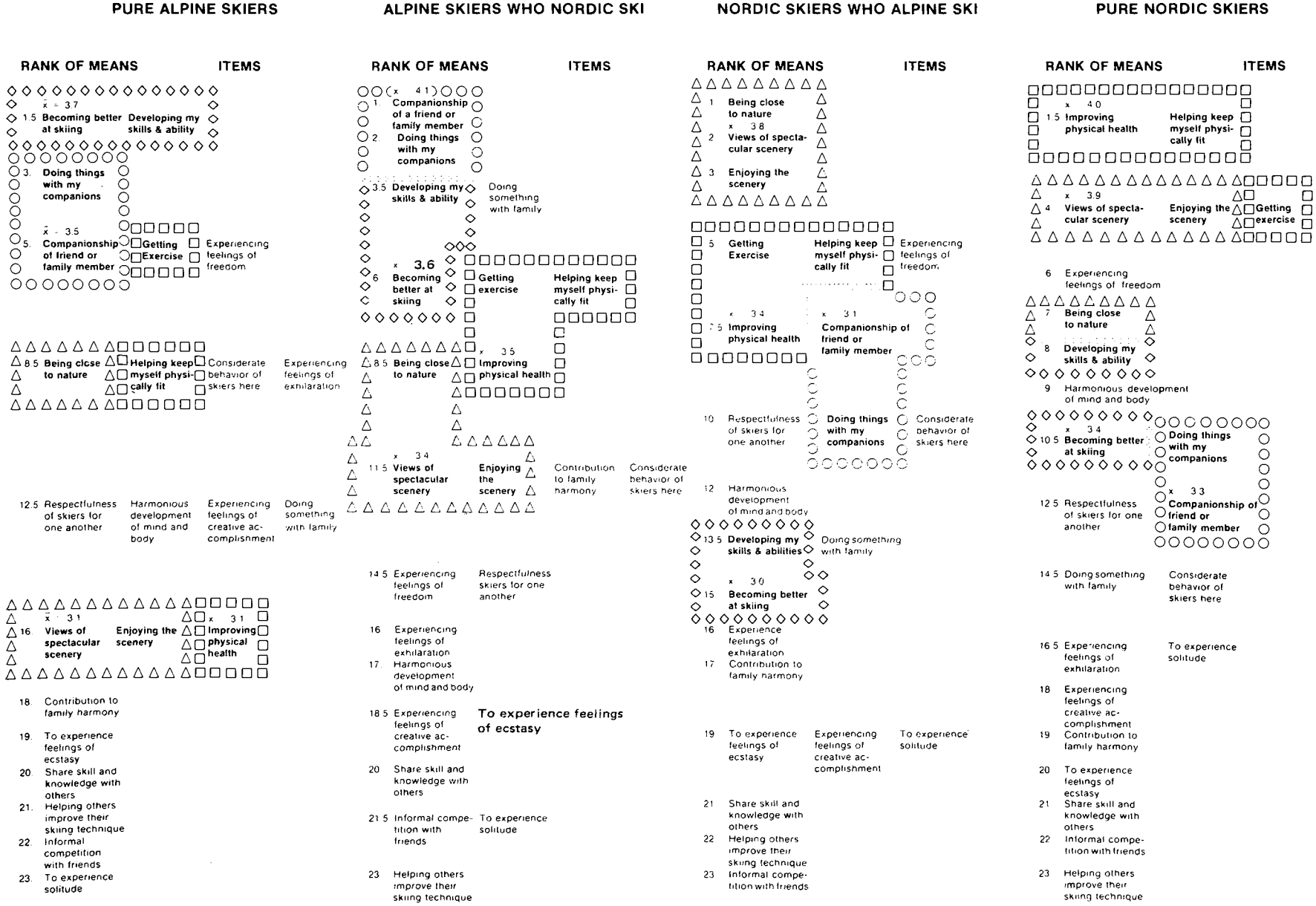

FIGURE 1: RANK ORDER OF SKIING MOTIVATION TERMS FOR EACH OF FOUR SKIER GROUPS

The means for IMPROVING PHYSICAL HEALTH and COMPANIONSHIP OF A FRIEND OR FAMILY MEMBER were identical, and ranked significantly lower ($p<.01$) than the mean importance score for VIEWS OF SPECTACULAR SCENERY.

Among nordic purists, the mean for IMPROVING PHYSICAL HEALTH was top ranked in importance but was not statistically more important than VIEWS OF SPECTACULAR SCENERY. For nordic purists, on the other hand, the safety and self-actualization items being compared had mean importance rankings significantly higher than the esteem and affiliation items, BECOMING BETTER AT SKIING ($p<.01$; $p<.05$) and COMPANIONSHIP OF A FRIEND OR FAMILY MEMBER ($p<.01$; $p<.01$). The means of these two lower ranked items did not differ significantly from one another.

To the extent that the items selected for the comparisons represent the Maslow needs they were intended to measure, what emerges is a picture of self-centered esteem need being highly important for pure alpine skiers, intermediate in importance for alpine/nordic skiers, and of relatively lower importance for both nordic/alpine skiers and nordic purists. The companionship aspect of affiliation appears to be highly important for both alpine purists and alpine/nordic skiers, intermediate in importance for nordic/alpine skiers, and of relatively lower importance for nordic purists. Self-centered safety and aesthetic self-actualization are apparently highly important needs for nordic purists, but are of relatively low importance for alpine purists. Aesthetic self-actualization is also of high importance for nordic/alpine skiers, and is intermediate in importance for alpine/nordic skiers. Self-centered safety is a need of intermediate importance for both of these combination skier groups.

MANAGEMENT IMPLICATIONS

No firm conclusions can be drawn from this study due to its exploratory nature. However, results do show that groups of cross country and downhill skiers may differ substantially in terms of demographic characteristics and motivations for skiing. Furthermore, each of these two types of skiers is composed of a substantial proportion of "combination skiers," skiers who participate or plan to participate in both kinds of skiing, making it possible to define four distinct skier publics or market types. Indications are that, at least within the Tahoe resort studied, it would probably be a mistake for managers to treat all skier groups as having similar motivations for skiing.

Even within the top ranked item means, our results indicate managerially relevant differences. Most striking were the rank differences of items measuring self-esteem, affiliation, self-actualization, and safety between alpine and nordic skiers. Alpine purists rated items measuring self-esteem and the companionship component of affiliation relatively high while they rated items measuring self-actualization and safety relatively low. The opposite was true for nordic purists. Managers of a resort with this clientele might find it profitable to incorporate a ski based physical fitness program in the nordic development to help satisfy the self-centered health aspect of nordic purists' safety need. Such a program might fail or succeed only marginally among alpine purists because the safety need ranks much lower. On the other hand, ski instruction might prove successful among alpine purists as a means to realize self-esteem, which ranks highly. It may well not succeed among nordic purists for whom this need apparently ranks much lower in importance.

It is interesting that TO EXPERIENCE SOLITUDE ranks very low for all groups except nordic purists and was apparently of only marginal importance to them. Perhaps, within a downhill resort setting such as this, not even the nordic purists need to find solitude to have a successful skiing day.

These are speculations rather than suggestions. More research is needed to explore other aspects of skier motivations such as certain "push" factors, in addition to more and better measures of the "pull" factors represented by Maslow need levels. The generalizability of this study is limited by the specialized setting in which the data were collected. Future on site studies comparing nordic, alpine, and combination skiers should also gather data from skiers at cross country resorts and in back country away from downhill resorts.

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PROVIDING MULTIPLE EXPERIENCE LEVELS FOR NORDIC SKIERS WITHIN THE SAWTOOTH NATIONAL RECREATION AREA

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Located within the heart of Idaho, the Sawtooth National Recreation Area is dominated by four mountain ranges and the headwater valleys of countless rivers and streams. This complex topography contributes to snow accumulation varying from a few inches to ten or twelve feet. The first snows fall in October. Accompanied by persisting sub-freezing temperatures, the snows remain until spring thaws in May. At higher elevations, one finds many perennial snowfields.

The diverse topography makes this area ideal for a variety of winter recreation pursuits. Snowmobiles find the open valleys and surrounding rolling hills and woods ideal. Spectacular, rugged peaks present challenges to the winter mountaineer. The gently, undulating canyons are custom made for a variety of cross country skiing experiences.

Because of its close proximity to Sun Valley Resort, as well as its ideal ski topography and snow conditions, the Sawtooth National Recreation Area has attracted a growing number of winter recreationists eager to experience the beauty and challenges of the winter mountain landscape.

During the winter of 1978-79, more than 20,000 skiers visited the Sawtooth National Recreation Area, 80 percent of them concentrating along a 20-mile by three-mile section of State Highway 75 which winds through the narrow Big Wood River Valley.

Because of this heavy concentration, problems have developed regarding adequate highway parking, sanitation, and visitor safety. By recognizing these potential problems early and responding effectively to solve them, and by managing our resource with a constant eye on the future, we hope to provide a high level experience to meet every skier demand.

The General Management Plan for the Sawtooth National Recreation Area provides basic direction for the recreation manager dealing with the wide range of winter recreation opportunities:

> "Provide the recreation facilities necessary to accommodate users pursuing a variety of recreational experiences. These will range from minimal primitive type to highly developed concentrated facilities."

The objective of providing for a variety of winter recreation experiences is uppermost in our ski trail planning process. To fulfill that objective, it is necessary to have a thorough knowledge of the skill levels of potential users, and a complete inventory of the areas which can accommodate those skill levels.

Our Nordic ski operation is designed to offer the Forest visitor a spectrum of skiing experiences for all skill levels.

During the winter of 1977-78, we began a ski trail grooming program in the popular Prairie Creek drainage 18 miles north of Sun Valley. Since 1974, a marked trail had been maintained at Prairie Creek, the drainage had been officially closed to oversnow vehicles, and Nordic skier use had been increasing. The site was a natural to begin our grooming program. Initial response to the groomed trail was so great that two additional trails have been located near the Prairie Creek system, and a fourth trail has been located near the Sawtooth National Recreation Area Headquarters building eight miles north of Sun Valley. During the past two summers, with the assistance of a five-person CETA crew and a 15-person YCC Crew, the trails have been cleared of obstructions, rerouted in a few places, and two additional creek crossings have been constructed to create a more efficient loop trail system. In order to help solve the problem of dogs on our groomed tracks, we have designated specific trails as dog trails. Though it doesn't always solve our problem, it is the first step toward educating people about dogs and groomed ski tracks.

We are now setting approximately 25 km of tracks;

providing trail marking and junction signing; bridging streams for safe crossings; avoiding known hazards; and generally allowing for maximum public safety and sanitation needs. With a modest investment of $4000, we have the equipment necessary to maintain a quality ski trail. Though the roller and track setter are small--designed to be pulled behind an Alpine Ski Doo double track snowmobile--we have been able to successfully keep up with our grooming program with very few problems.

During the 1978-79 winter, our grooming costs were approximately seven dollars per kilometer. For the five thousand persons skiing on our prepared tracks, the cost was about forty-four cents each. We anticipate that the increasing numbers of skiers on groomed trails justify predictable increases in grooming costs.

As a skier's skill level increases, he begins to seek out more challenging experiences.

In 1978-79, forty percent of our winter ski use occurred in dispersed, undeveloped areas. We have identified several touring routes which offer a more wilderness experience and demand a higher degree of self-reliance than groomed trails. These routes are marked by name and symbol signs at appropriate plowed turnouts along the highway. They are also keyed through our cross country skiing brochure to a handout map. A person using the brochure, map, and roadside signs as planning tools can enjoy many kilometers of ski touring.

A growing phenomenon in our area is the number of skiers seeking out the "steep and deep". Every new snowfall lures skiers using both Nordic and alpine equipment to the Galena Summit area of State Highway 75. Here they begin their run near the highway pass, descending to points along the road, then shuttle back up for another try.

Last winter more than 2200 persons skied the Galena Summit area. Unfortunately, avalanche danger is often high. Consequently, potential avalanche accidents are of great concern to the Forest Service. In an effort to prevent a tragedy, we have signed hazardous areas along popular ski routes. By making people aware they are entering an avalanche area and that the Forest Service does not recommend travel through the area, the responsibility is placed on the user. Two signs are in place on Galena Summit and several more are located in popular drainages throughout the Sawtooth National Recreation Area. Though we cannot sign every hazardous area, by placing warning signs along popular routes, hopefully most of our visitors will be aware of the hazard.

In addition to the signs, personal on-snow contacts are made periodically to inform skiers of the present snow and avalanche conditions and the hazards of winter back country travel. Public avalanche clinics have also been offered by local retail stores in cooperation with the Forest Service to teach the fundamentals of avalanche awareness and route selection.

While powder skiing offers a thrilling dimension to the more advanced ski tourer, a winter campout or mountaineering adventure might be the ultimate experience. The Sawtooth Mountain region offers exceptional challenges to the winter mountaineer. While the hazards of this activity should be obvious, we attempt to contact those planning winter expeditions to the Sawtooth National Recreation Area. We provide snowpack information gathered throughout the winter from snowpit studies; relate predicted weather conditions, current and potential avalanche hazard; and suggest routes which might be less dangerous. When these contacts are made, we also have the party complete a registration form. In the event of a mishap, this may aid a search party. In addition, a multi-network avalanche warning system is maintained by the Forest Service for the mountainous area of South Central Idaho. Released simultaneously with National Weather Service forecasts, the warnings are broadcast through television, radio, and newspaper outlets during periods of high avalanche hazard. The warning system is part of a larger network of western avalanche forecasting centered at the Rocky Mountain Experiment Station in Fort Collins, Colorado.

Obviously the range of possible cross country skiing experiences within the Sawtooth National Recreation Area is as diverse as the visitors' imagination. However, one facet of the growth of Nordic skiing which has contributed generously is the cooperation of local organization and private enterprise.

In the fall of 1973, several far-sighted individuals met to discuss a potential snowmobile-cross country skier conflict in the Wood River Valley. From this meeting, an unwritten agreement emerged which stated that snowmobiles would not use the upper end of the Wood River Valley, a narrow valley bottom not ideally suited to snowmobiling.

Since that time, ski touring has grown to be the major winter use in the Sawtooth National Recreation Area. Much of this growth has centered around Galena Lodge, a Nordic touring center operated under Special Use Permit from the Forest Service since the decline of the old Galena mining camp around the turn of the century. During the winter of 1974-75, the first ski trails were marked. Since that time, Galena's operation has grown to where over 6000 skiers utilized the 40 kms of machine-groomed trails last winter. A second Nordic operation,

Busterback Ranch, began machine grooming a 35 km trail system during the winter of 1976-77.

Recently, a revised Twenty-Year Special Use Permit, including the ski trail system was issued to Galena Lodge. This permit is administered similar to a downhill ski resort permit and is the first of its kind for a Nordic ski operation in the National Forest system. The new permit allows Galena Lodge to charge a trail use fee instead of requesting a trail donation, a common practice with National Forest Outfitter Guide Nordic Ski Operations. Conversion of the Busterback trail system from the present outfitter guide permit to a special use permit will probably occur in the near future.

Administration of these two facilities requires close contact with the permittees to discuss trail maintenance and layout, proposed races and other special events, plus general operational procedures.

During the winter of 1975-76, an additional outfitter guide operation, Leonard Expeditions, began offering week-long guided ski tours into the Sawtooth Wilderness and surrounding areas. Catering to the person who has the desire to travel the winter backcountry, but not the expertise, Leonard Expeditions offers back country skiing for all levels of experience from "level meadows to 1500 foot powder bowls"; from wood heated huts to snow caves. A detailed snow safety and operating plan developed jointly with the permittee and the Forest Service, outlining avalanche rescue procedures and guide qualifications, is a must with this type of operation where organized rescue parties are usually several hours away.

In December of 1974, Forest Service officials assisted local ski enthusiasts in setting up and conducting the first USSA recognized Nordic ski instructor and guide clinic in the Intermountain Region. From this clinic, a set of guidelines was developed that continue to be in use in the Nordic ski certification program today. Each ski guide or instructor must have successfully completed this course or a similar one, plus obtain a State of Idaho guides license before he can be eligible to guide or instruct on National Forest land within Idaho.

Development of a 30 km ski trail from Galena Lodge to North Fork has been proposed by the backers of the annual Boulder Mountain Marathon Race. Though groomed in entirety only immediately preceding the race, portions of the trail would be marked throughout the winter, making an excellent alternative available to the non-track skier or snow shoer. During the fall of 1979, several members of the Sun Valley Nordic Ski Club, assisted by Forest Service officials, cleared a two mile section of the ski trail that had previously presented a serious hazard to the trail grooming operation. Continued volunteer community cooperation in trail layout and construction is a key to reducing Forest Service ski trail costs.

Cooperation among Governmental agencies is also a way of reducing costs while still getting the job done. During the summer and fall of 1979, the Ketchum District of the Sawtooth Forest, entered into a coop agreement with the Bureau of Land Management to construct a multi-purpose trailhead facility on Bureau of Land Management land three miles north of Sun Valley. $23,000 of Forest Service funds were allocated to construct a 30-car paved parking lot, toilet facilities, and trailhead signs on the popular Hulen Meadows Trail. The Bureau of Land Management contributed $40,000 to the project to install a 150 foot, single span, pedestrian bridge over the Wood River to permit access to the trail system. Initial trail construction labor was completed in 1977 with a $16,000 Federal grant supplied through the Ceta program. The 12 km trail system, groomed and extensively used by Nordic skiers in the winter, becomes a multi-purpose hiking, jogging, and equestrian trail during the snowless months. Recently, the Hulen Meadows Trail was designated as a National Recreation Trail by the U. S. Department of Heritage and Conservation.

As winter use increased throughout the Sawtooth National Recreation Area, it became obvious that highway parking would have to be regulated. Parking within the highway right-of-way created serious conflicts with snow removal equipment and winter users. As a result, areas of concentrated use were identified and with the cooperation of the Idaho State Highway Department, highway turnouts were constructed and paved at more than 40 sites within the Sawtooth National Recreation Area. These turnouts are regularly maintained by the highway department as part of their snow removal program. As winter use increases, necessary additional turnouts or expanded existing turnouts will be identified and constructed.

In order to justify continued budget support of our winter recreation management activities, accurate use figures are a must. Because winter season parking is restricted to plowed turnouts on the Forest, accurate vehicle counts are simplified. On-trail user counts are made via personal contacts, as well as utilizing an infrared reflected beam trail counter. Use figures are also collected from touring centers operating on the Forest. We have abandoned the use of registration boxes at trailheads after finding that ten percent or less of the skiers were signing in.

While these use figures are important for cost/benefit purposes, the car counting and personal contacts give a broad dimension to our recreation planning process. License plates give us an idea about users points of origin. Personal contacts afford a means of providing information, relating safety considerations, and exchanging ideas and learning from users what their needs and expectations are. For example, we have found that an increasing number of our visitors are on Alpine ski vacations in Sun Valley and have decided to try cross country skiing for variety.

By combining our use trends with those of local rental and retail Nordic ski shops as well as Regional and National trends, we can make reasonable projections of use patterns throughout the area and thus can be adequately prepared to meet skier demands from every experience level.

Ten years ago, our concept of cross country skiing was vague and naive. We have since grown into an organization aware of the sport's diversity and sophistication. Hopefully, we are responding with creativity and foresight. National Forest lands represent a major portion of America's playground. With continued support and dedication, we can fulfill the needs of our winter visitors.

DISPERSED WINTER RECREATION USE IN THE BADGER PASS BACKCOUNTRY OF YOSEMITE NATIONAL PARK: CHALLENGES AND OPPORTUNITIES

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INTRODUCTION

During the past several years there has been a phenomenal growth in outdoor recreation. This growth is due to many factors such as expanding urbanization, greater mobility, a well-developed highway system, more leisure time, and efficiently designed equipment. One aspect of this situation is the increasing use of backcountry areas by outdoor recreationists.

This use, which is concentrated during the summer months, has often resulted in the damage to fragile backcountry resources. This damage, characterized by trampled vegetation, polluted water, blackened rock fire rings, and conflicts between users, is a burgeoning problem. The Yosemite National Park backcountry is among the areas which is experiencing human impact problems.

Recently, there has been a heightened nationwide interest in dispersed winter recreational activities. This interest is characterized by the growing numbers of people who have been attracted to ski touring. National parks, national forest areas, and tracts of land in and near urban centers are being utilized by outdoor recreationists during the winter season.

Dispersed winter recreation use in Yosemite National Park--which is centered in the Badger Pass backcountry--has followed national trends and grown over the past several years. This condition necessitates examination by Park managers, as increased interest in dispersed winter recreational activities magnifies human impact problems.

As recreation use of the Badger Pass backcountry continued to expand, Park managers needed comprehensive visitor use data. The study was conducted in order to meet this exigency: the development of base data which plays a role in the formulation of management objectives and area-wide plans.

METHODOLOGY

Sample Design

The study involved a stratified random sample of overnight and day winter visitors in the Badger Pass backcountry of Yosemite National Park. The strata were based on two criteria: (1) interview site location and (2) day of the week.

Located along the Glacier Point Road, the two interview sites--Summit Meadow and Bridalveil Creek Campground--serve as parking areas for the visitors. In relation to the other stratum, day of the week, it was expected that there was a difference in the attitudes and preferences of the people who travel in the Badger Pass backcountry during the week as contrasted with the people who travel in the area on weekends.

Procedures

The researcher conducted the study for one-day periods. In relation to weekend use, three days were selected for each interview site. In relation to weekday use, two days were selected for each interview site. A total of ten days was randomly selected from a three-week study period.

Two separate in-the-field pre-tests were conducted in January and February, 1978. The study was conducted during March 1978.

Sample Selection

Three hundred and thirty questionnaires were distributed to overnight and day visitors. This figure represents an approximate seven percent sample of total registered overnight and day use during the 1975-1976 winter season. (The researcher utilized use figures from this season because it, as contrasted with the atypical 1976-1977 winter season, represented a "normal" winter in terms of snowpack and visitor use. The sample design and sample selection process were developed within this parameter.)

Sampling was conducted at the two interview sites. At the Summit Meadow site, 53 percent of the questionnaires were distributed. At the Bridalveil Creek Campground site, 47 percent of the questionnaires were distributed. Trailhead quotas were based on area visitor use patterns.

RESULTS

The findings from the study provide Park managers with: (1) a profile of winter visitors in the Badger Pass backcountry, (2) information needed to manage visitor use in the area, and (3) information necessary to develop plans for managing access and parking.

Components

Visitor Profile. The major findings in this section show that:

1. The visitors were highly educated--92 percent had completed some college, graduated from a four-year college, or completed some graduate work.

2. Residents of San Francisco Bay area counties were the largest group in the sample. The next largest group of visitors was from the Los Angeles Basin and southern California area.

3. Most of the visitors, 96 percent, were ski tourers.

Visitor Use. The principle findings from analysis of data on visitor use in the Badger Pass backcountry are:

1. Over 80 percent of the visitors sampled went on a day trip.

2. There was a high rate of trip registration compliance for visitors who traveled in the area for overnight periods.

3. The people who traveled in the area had little winter travel experience in the Badger Pass backcountry and a moderate amount of winter experience in other backcountry areas.

4. Many of the visitors did not encounter any impact problem. Lack of solitude was the most frequently cited impact problem.

5. There is strong support for the development of more ski huts, winter trails, and winter trail markers.

6. There is strong opposition to the removal of the Ostrander Lake ski hut and the reduction of existing winter trails and winter trail markers.

7. Thirty percent of the visitors favored the establishment of day use quotas and 39 percent were opposed.

Access and Parking. A summary of visitor preferences towards access and parking include:

1. The Chinquapin Junction staging area/shuttle bus system and the Badger Pass downhill ski staging area/shuttle bus system were almost equally preferred by the visitors.

2. The management plan receiving the least support was the Badger Pass downhill ski area/backcountry use center. (This management plan proposed that the Badger Pass downhill ski area would serve as a backcountry use center and that the Glacier Point Road would not be plowed beyond the downhill ski area road junction.)

3. Overall, an average of 40 percent of the visitors sampled were opposed to each access and parking management plan.

FINAL REMARKS

Interest in dispersed winter recreational activities is expanding in Yosemite National Park. This interest is characterized by the increasing number of visitors who travel in the Badger Pass backcountry during the winter months. The direct and indirect impacts of this growth include crowded winter trails, high noise levels, visitor safety, lack of support facilities nearby backcountry trailheads, vehicular congestion and parking problems. These impacts cannot, however, be neatly separated into discrete categories. The whole system, with its interlocking relationships, must be examined.

As dispersed winter recreation use increases, more personnel will be needed to effectively administer the Badger Pass backcountry area. The Badger Pass downhill ski area operation will be influenced by the growing number of winter backcountry visitors. Support facilities in the Park--highway maintenance, automobile services, fuel allocation and distribution, food supplies, and overnight accommodations--will be affected. The communities inside and outside the Park boundary will feel the "rippling" effect of the growth of dispersed winter recreation use.

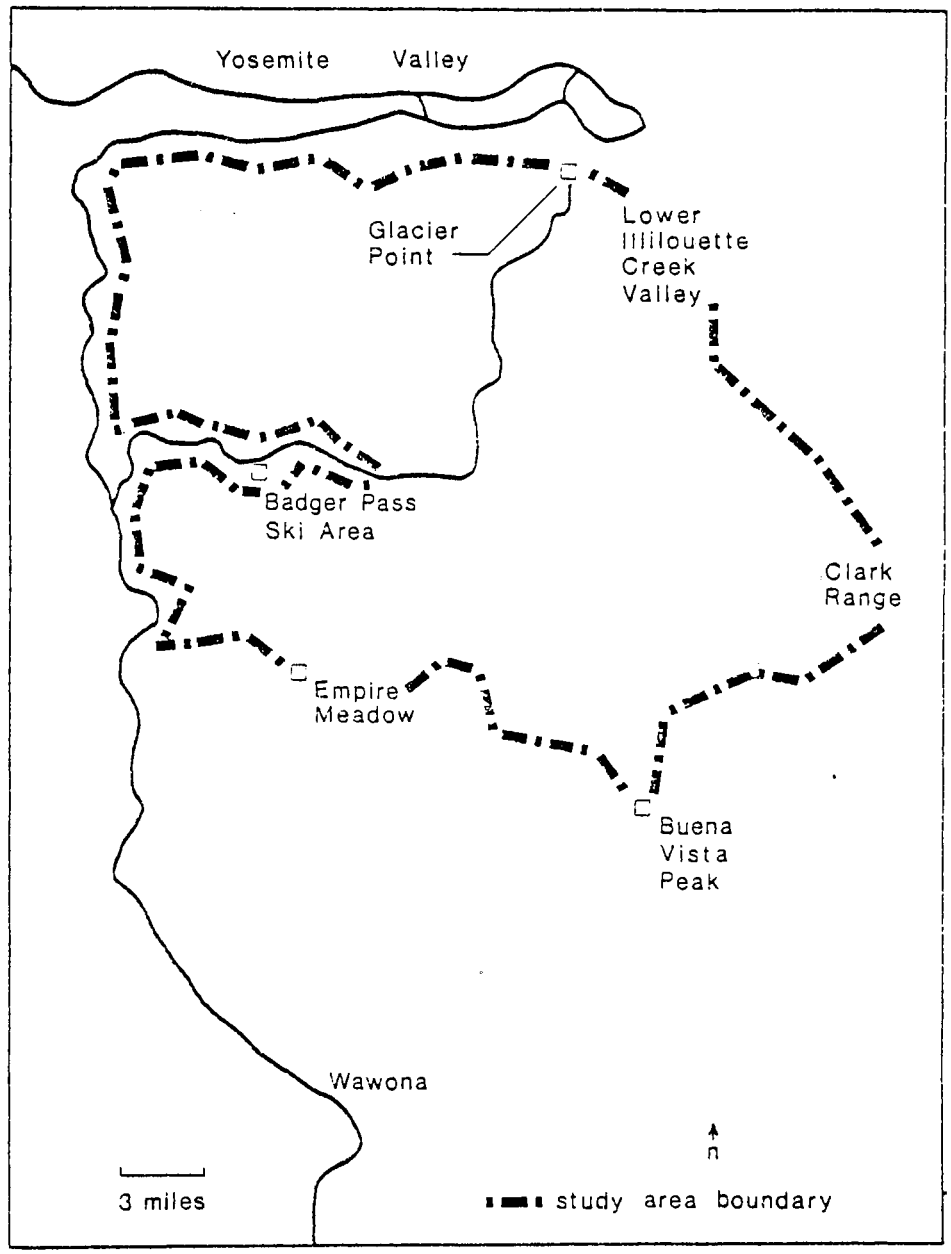

Figure 1. Badger Pass Backcountry Study Area
Yosemite National Park, California
1978

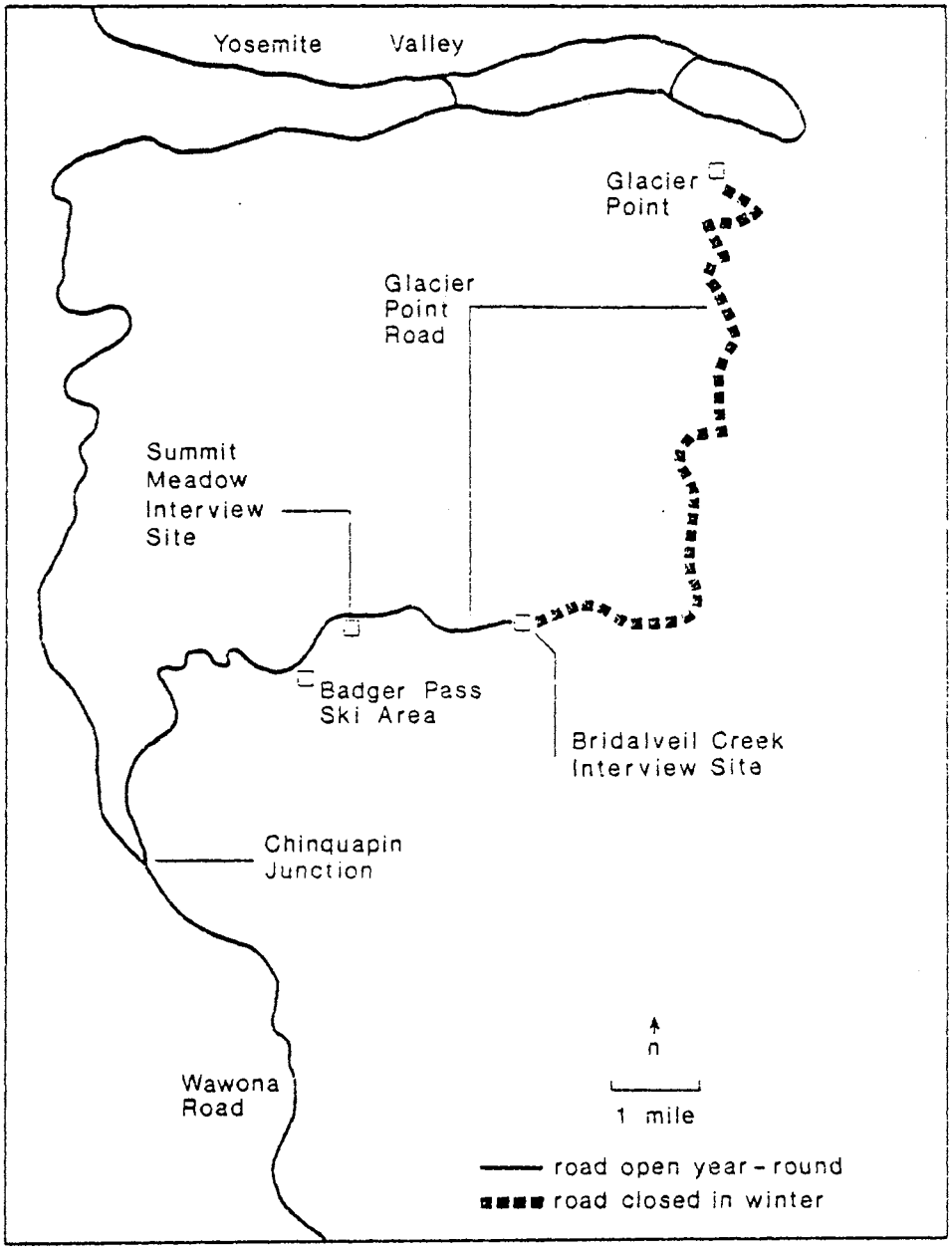

Figure 2. Interview Site Area
Yosemite National Park, California
1978

COMMERCIAL HOSPITALITY OPERATIONS SERVING THE DISPERSED WINTER RECREATOR IN THE UPPER GREAT LAKES REGION

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This paper examines the patterns of hospitality services that are evolving to serve dispersed winter recreational activities. These observations are based largely upon the Minnesota scene. It is assumed that the principles observed in Minnesota will also hold in the other Upper Great Lakes states of Wisconsin and Michigan.

The Historical Setting

Prior to 1970 a winter sports area in the Upper Great Lakes area offered primarily ice fishing or downhill skiing. In the latter case there was usually a chalet to provide lodging, apres ski activities and entertainment. The sports area was usually a business operating under one management. There were occasional hardy souls who went sightseeing in the winter and depended upon commercial lodging facilities. But these facilities did not cater to this type of market, nor was the market of sufficient magnitude to warrant special attention.

Development of the snowmobile, adequate winter clothing, and cross-country skiing have brought about a substantial change. As a result there is a newly emergent supply response to the demand for dispersed winter recreation. Two types of dispersed winter sports areas are recognizable. One is the former exclusively downhill ski area which has "added on" snowmobiling and cross-country skiing as part of the package offered. Often the area's services have also expanded through satellite businesses that "piggy back" upon the central enterprise. The second type and the one which this paper focuses upon is an emergent new pattern consisting of clusters of hospitality operations that were primarily developed initially to serve other types of markets. These are summer resorts and motels, in the north woods and waters area of the Upper Great Lakes states which have been winterized. Along with the resorts and motels there are substantial complexes of facilities including trail networks, food and beverage operations and snowmobile services.

In some settings, more than a supply response may now be underway. Momentum has been attained such that the supplying areas are interacting with markets in such a manner that they are actually generating demand.

Methodology

A mail survey to a randomly drawn sample of Minnesota resorts served as one of the primary instruments for gathering the data for this research report. It contained a battery of questions concerning winter operations as part of a more comprehensive questionnaire on resort operations and rate structures. Motel studies conducted in 1978 and 1979 were also available, although these did not deal as comprehensively with winter operations.

The second major data procedure was to assemble winter recreational literature from communities where major dispersed winter recreational services are developing in Minnesota. This information was systemmatically studied and backed up with interviews of individuals who were knowledgable about each operation. Other supporting data comes from the Minnesota Department of Natural Resources (snowmobile and ice shelter house licenses), and from a number of special lake area and community tourism studies which have been conducted by the University of Minnesota over the past ten years.

The Scope of Hospitality Businesses Serving Dispersed Winter Recreation

In 1979 there were an estimated 329 resorts in Minnesota that operated during the winter. This is 17% of the total number in the state. Not all of these were actively serving the dispersed winter recreator, since many operations that are open in the winter cater to markets that are not recreationally oriented. However, many of these latter were available to the dispersed winter recreator should they wish to use their services in the given locality.

It will be noted, table 1, that almost all of these resort operations were in the northern half of Minnesota and 85% of them were in the two tourism regions of Heartland (North Central) and Arrowhead (North East). In these two regions about 21 percent of the total number of resorts are operating currently in the winter. This compares with fewer than 10% in Vikingland (North West) and less than 7% in the southern regions. It suggests that there is a relationship between the areas finding winter operation to be profitable and concentrations of hospitality services, "in-place" tourism marketing machinery and the resources of winter weather and interesting terrain.

Table 1. Winter Operation of Minnesota Resorts by Regions, 1979.

Tourism Region	Current Winter Oper.	Former Winter Oper.	Plan Winter Oper.	Oper. In Summer
Arrowhead (N. East)	80	20	12	360
Heartland (N. Central)	200	45	58	963
Vikingland (N. West)	41	46	10	447
Southern Regions	8	16	5	120
All Minn.	329	127	85	1,890

Source: Survey of Resorts, University of Minnesota.

Table 2 lists the facilities available for winter guests. The almost 40 percent offering ice fishing shelters for rent probably reflects the recent history in which this was the only winter sport available beside down-hill skiing. Relatively few offer snowmobiles or cross-country skiis for rent, amounting respectively to 15% and 11%. This is a measure of the profitability and attendant problems of these rentals rather than a measure of the two activities. About half offer food and beverages; this is not only a profit maker, it is essential to attracting recreators.

Table 3 gives the operators' estimates of the relative importance of the several types of winter recreational activities. The figures represent relative weights which have been adjusted so that they total to 100. As expected, snowmobiling leads the list at 38. But ice fishing comes in with a figure almost two-thirds that at 24. Cross-country skiing in turn is three-fourths as important as ice fishing. These three outdoor recreational activities make up about 80% of all the activities. The estimate for "socializing" is probably a substantial understatement of the actual importance of this factor. Operators are thought to have reported primarily in terms of their observations of "outdoor" activities. By this it is meant that the figures as portrayed here probably do not accurately reflect the "package" which winter recreators buy when they are "buying" a resort stay in the winter. The "package" consists of 1) the outdoor activities of snowmobiling, cross-country skiing or fishing 2) the winter landscape, and 3) the lodging amenities, camaraderie and socializing with friends. These are joint products which are purchased together. This research could not adequately evaluate the package.

Table 2. Facilities and Services Available by Minnesota Resorts Operating in Winter, 1979.

	Percent Offering the Serv.	Average Daily Rental
	%	
1. Snowmobile Rentals	15	$36.00
2. Cross Country Ski Rentals	11	6.90
3. Fishing Shelter House Rentals	39	13.70
4. Sit Down Dining	52	—
5. Short Order Food	39	—
6. Beer	50	—
7. Groceries	31	—

Source: Survey of Resorts; University of Minnesota.

Table 3. Winter Recreational Activities of Minnesota Resort Customers, 1979.

Activity	Percentage Weighting
Snowmobiling	38
Ice Fishing	24
Cross-country Skiing	18
Socializing	12
Sightsee	4
Downhill Ski	1
Other	3

Source for Table 3: Survey of Resorts; University of Minnesota. Weightings are estimates made by operators.

Resorts appear to be relatively unstable in winter operation. The average resort reporting winter operations had only been in this business 5.2 years. The stability of winter operation is much greater in the better adapted areas of Arrowhead and Heartland. There, only one-fourth of the number currently operating had previously tried winter operation and then dropped out. In Vikingland and Southern regions more operators had "tried it" and quit than those currently operating.

In addition to the resorts operating a winter business, 124 Minnesota motels, equal to 17% of the total number of motels in the state, are estimated to be actively pursuing the markets generated by dispersed winter recreational activities.

Problems of Winter Operations by Resorts

Winter operation can spread fixed costs and family labor over a longer season, but for many summer resorts it poses basic questions concerning profitability. This is due to the matter of capital costs to convert to winter operation, and the problems associated with winter markets. These operational problems are discussed in further detail:

1. The capital cost of winterizing includes first the preparation of lodging facilities so that they can be comfortably occupied in winter. This means insulation and adequate heating. For many existing resorts water and sewage systems pose even greater problems. Frost control of water lines often means laying lines as deep as eight feet. This may not even be possible in hard rock areas. Winterized buildings may function best with basements. The sewage system also often needs added capacity or redesign for winter operation.

2. The market for dispersed winter recreation is primarily concentrated in the week-ends. Resorts reported that 82% of their business was on week-ends with only 18% during the weekday. This results in a low occupancy for the week despite high capital and operating costs.

3. Cost for operation in winter months are increasing rapidly due especially to higher heating and lighting costs. Heating problems are magnified because units that are only occupied on week-ends must be heated throughout the week.

4. Unavailability in winter of high school and college labor which is employed by many resorts in the summer, is a further problem and cost.

5. Marketing problems for dispersed winter recreation, in addition to concentration on week-ends, include:

   --- Travel for winter recreation is short-distance. This is documented by recent Minnesota Department of Natural Resources studies. As marketing patterns now stand, this restricts the market potential.

   --- Competition from the fun-in-the-sun appeal of exotic winter vacations far eclipses the promotional effort made by dispersed winter recreation areas. The Upper Great Lakes mindset is to "vacation South" in Winter. A typical midwinter Sunday Newspaper Travel section will have 6 pages devoted to fun-in-the-sun, and only one-half a page devoted to recreational opportunities in the Upper Midwest.

   --- There is concern for the long term dispersed Winter recreation market. Is its current popularity a fad? Snowmobile purchases (Table 5) reached a peak in the early 1970's. Winter fishing shelter numbers appear stable (Table 4). These data do not show person-days of activity, which in the case of snowmobiles is thought by many observers to have declined.

6. Winter operation also has its weather hazards. The "snow drought" which extended until well into January 1980 in most states east of the Rocky Mountains cut severely into anticipated business. For most, it ruined the usually lucrative Christmas-New Years week. At the opposite extreme, too severe a winter can also curtail outdoor activities.

The several business types serving the dispersed winter recreator confront distinctly different market-operating conditions. The typical resort serves primarily the recreation trade and is geared to week-long stays. In winter, recreational markets concentrate on week-ends. Resorts must find some other means of "piecing out" the week's business, otherwise they may operate profitably only two days per week. These adaptations are discussed in the next section.

Down-hill ski areas were set up initially for winter operation. While they have their share of problems they should be better adapted both

to weekends and to winter.

Table 4. Winter Fishing Shelter houses Licensed in Minnesota.

Year	Number Shelter Houses
1978-79	39,593
1977-78	75,529
1976-77*	96,777
1975	74,728
1974	43,722
*	*
*	*
*	*
1964	64,051

Source: Minnesota Department of Natural Resources. *In Winter of 1976-77 registrations were extended to March from the previous year. Prior to that Registration was by calendar year.

Table 5. Minnesota Snowmobile Registrations by Year 1971-79.

Year	Total Number Registered	New Machines Registered
1979	282,000	34,330
1978	267,579	32,586
1977	277,566	27,682
1976	229,488	29,874
1975	287,588	44,806
1974	275,778	48,455
1973	270,374	38,046
1972	NA	85,686
1971	NA	73,332

Source: Minnesota Department of Natural Resources.

Motels, on the other hand, typically serve a predominantly weekday market. Week-end business is a bonus; if they can fill up with recreators on Friday and Saturday nites they have greatly enhanced profit prospects. Unfortunately few have been able to capitalize on winter recreation. A 1978 study found that only two percent of Minnesota motels had their highest occupancy rates in Winter. Significantly, half of these were in the Arrowhead region. For most, winter recreation markets have not yet taken up the slack in generally lower rates of winter travel; in 1978 occupancy rates of Minnesota motels in the January-April period averaged 48 percent compared to 78 percent for May-August months.

Individual Adaptations for Winter Operations of Resorts

Not all of the 329 resorts indicated as operating in the winter are available to serve winter recreators in a manner comparable to their service to summer recreators. Most have an individualized adaptation to the circumstances of winter operation and the peculiarities of winter markets.

1. Some operate only their food and beverage business in the winter months and do not have rental rooms open.

2. Some rent their lodging facilities to permanent guests such as students, school teachers and other winter residents of the area.

3. Some remain open and serve mainly work crews and others who are traveling for business in the area.

4. Some with excellent food and beverage service depend upon this service as the major profit center in the winter months, while also leaving their lodging facilities open and mainly available for outdoor recreators. Such operations primarily market their food service to the local community, including the catering of parties and group businesses as a part of this winter operation.

5. Winter convention and conference group sales are important for some operations. The appeal of outdoor recreational activities of snowmobiling and cross-country skiing may become a major part of the reason why a group chooses the specific location and hospitality service.

6. Some operations serve as "satellite" businesses to large down-hill operations. They take the overflow thus making possible a higher loading on the ski lifts.

7. Some operations tap markets by means of

package tours. Bus tours appear to adapt well to Cross-country Ski Clubs, students and Senior Citizen groups.

The above are methods for adaptation to winter operation primarily by firms that were initially established to serve summer recreators.

The Adapted Down-Hill Ski Area

Many down-hill ski operations in the Upper Great Lakes have adapted their facilities to also serve cross-country skiers and/or snowmobiles. This expands opportunities for dispersed winter recreation. It also broadens the market appeal for the given operations. A number of these operations represent a major part of the local economy. Their growth is often due to the entrepreneural capability of one individual or a small group of individuals. Each operation is unique; two are discussed briefly as illustrations:

--- Telemark at Cable, Wisconsin has operated as a ski resort since 1947. In 1973 it expanded into cross-country skiing and has concentrated on selling to the upscale (higher income-higher spending) cross-country market. The American Birkabeiner was introduced as a means of securing prime time television coverage for cross-country skiing. Telemark's cross-country ski business now exceeds down-hill.

--- Lutsens at Lutsen, Minnesota developed a down-hill ski resort from a business originally featuring fishing. This operation is the focus of a substantial complex of businesses. Within a radius of 5 miles there are at least 16 satellite operations including motels, condominiums, gift shops, resorts, and gasoline service. It contributes to markets of hospitality operations that are 25 miles distant.

The Anatomy of the Dispersed Winter Recreation Area

The second type of winter recreation area is newly emergent, with potential for development in many Upper Great Lakes communities. It appears to be community centered, involving clusters of hospitality and other businesses. Many of these have adapted from other types of markets, particularly summer recreation, to serve the dispersed winter recreator. Ingredients of the areas, shown graphically in figure 1, include:

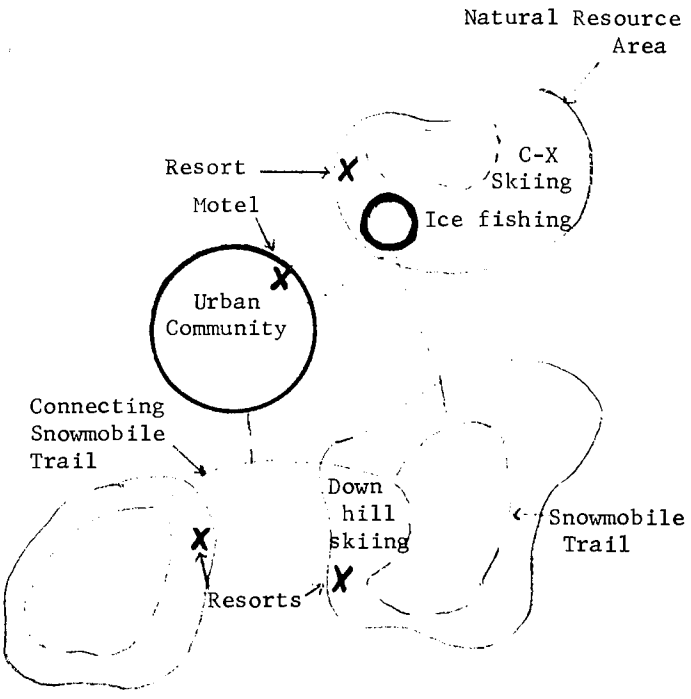
--- Natural resources including interesting terrain, vegetation and winter weather. While necessary, natural resources are by no means sufficient.

--- Trail systems provide the major activity attraction. Usually there are both snowmobile and cross-country trails. Development of these trail systems usually involve input combinations from private firms, local groups, and local, state and Federal Governmental Agencies.

--- Hospitality services which usually consist of combinations of motels, resorts and food and beverage services. Camping facilities are a factor in some settings. Hospitality services are as important as trails in accessing the winter resources; they are necessary for those who are a distance from home; and they are the means whereby the community receives economic returns.

--- Community leadership, usually this bases upon the same structure as that which develops and promotes summer tourism. This leadership has the characteristic and capability for recognizing tourism's importance, taking initiative in developing trail systems, managing special events, and operating marketing programs. Usually leadership focuses upon a population center such as a county seat, and draws its major strength from hospitality operations.

Figure 1. Anatomy of a Snowmobile-Cross-country Skiing - Winter Sports Area.



A substantial number of Minnesota winter sports areas have now developed. They make available maps of the trail systems and promote winter activities. These were given added impetus in the fall of 1979 by a major program of winter recreation promotion by the Minnesota Bureau of Tourism.

Table 6 outlines features of selected winter recreation areas. Four are discussed in greater detail below:

Detroit Lakes-Becker County: This is the most westerly of these areas. The area map advertises 200 miles of trails plus the following services:

15 resorts, 6 with campgrounds available

1 Campground

6 Motels

4 Supper clubs and restaurants

Nineteen of the above operations sell food, 19 provide bar service, 15 sell gas, and 13 sell groceries. In addition there is a super-market, a sporting goods center, plus several snowmobile services and real estate businesses that are advertised on the area map. The Detroit Lakes market primarily originates in the nearby area of North Dakota and the Red River Valley of Minnesota.

Table 6. Businesses Serving the Dispersed Winter Recreator by Selected Minnesota Communities, 1979.

	Alexandria, Douglas County	Park Rapids, Hubbard County	Detroit Lakes, Becker County	Walker, Leech Lake
Resorts (number)	4	27	15	15
Rental Units	NA	173	102	49
Motel (number)	6	2	6	4
Rental Units	NA	55	179	63
Other Businesses	27	17	4	NA
Miles S.M. Trails	270	1,000	200	600

Source: Survey of Literature from indicated communities.
NA - Not Available

Park Rapids-Hubbard County: This winter recreation area is the most extensively developed of all. It claims access to 1,000 miles of trails and its leadership is moving to connect to adjacant trail systems to create an even larger complex. Among its services are

27 Resorts

2 Motels

1 Winter campground

16 Other businesses including restaurants, snowmobile services and 3 grocery stores.

Its calendar of events lists three winter-oriented community-sponsored happenings:

Eagles Heartland Grand Prix Snowmobile Race

Long Pine Cross-country Skiing race (13 Km)

Lion's Club Fishing Derby

Despite progress there is a deficit in winter business scale compared to summer. The area can host overnite 1,100 in winter and 5,600 in summer.

The Gunflint Trail: This area is an exception to the rule of winter areas being organized about a population center. It is isolated on a dead-end road on the east end of the Boundary Waters Canoe Area of extreme north-eastern Minnesota in Cook County. A group of 9 resorts are operating there to develop a facility for both cross-country and snowmobile recreation. But it does have a strong area identity. This area has the longest winter season and the most dependable snow of any part of Minnesota. It was, for example, the only place in Minnesota where cross-country skiing and snowmobiling could be enjoyed over the 1979 Christmas-New Years holiday.

Crow Wing Trails-Wadena County: This area is described because it also represents an exception to what appears to be the typical dispersed winter sports area. A trail system has been developed along a 50-mile section of the Crow Wing River. This system was developed with leadership from the County Park Board and the Minnesota Department of Natural Resources. There are no overnite lodging facilities in the immediate vicinity. The trails are of good quality and despite the lack of lodging facilities, and the leadership provided by them, it was estimated that there were 8,000 person-days of use by non-resident snowmobilers in the 1978-79 season. They spent an estimated $25,000 in the two small communities plus the two isolated recreational

businesses that service the area.

Non Developed Area: An area that is 100 miles long lying 50 to 100 miles north of Minneapolis-St. Paul has an abundance of natural and winter season resources. These include 8 state forests, a wildlife area and 4 state parks. However, apparently because winter recreational leadership has not emerged this area has not developed its dispersed winter recreational potential despite easy access to the Minneapolis-St. Paul population base. There are good trails in some of the state parks, but the area lacks identity. The missing ingredients appears to be 1) leadership and 2) hospitality services. Because of these missing ingredients the resources and trails of this area contribute much less to local economies than might be the case.

Some Tentative Conclusions, Propositions and Principles

Stated here are four propositions which are suggested as having general application to the evolving pattern of hospitality businesses that serve dispersed winter recreation in the Upper Great Lakes Area.

1. The organization of hospitality businesses to serve the dispersed winter recreational activities is currently in an adolescent stage. Profits for some individual operations are uncertain. There is relatively rapid turnover or movement in and out of winter businesses and markets are not well established. In 1979 for the first time the state of Minnesota mounted a substantial winter advertising program. Critical masses of operations capable of delivering reliable services and sustained promotional programs are just now beginning to form.

2. The emergent dispersed Winter Recreation Area appears to have the following anatomy:

   --- Natural resources of interesting terraine, vegetation and winter weather. This appears, in Minnesota, to be the least limiting factor.

   --- Trail Systems - these provide the activity attraction.

   --- Hospitality businesses provide access, means for temporary stays in the the area, and economic returns to the community. They tend to cluster about or be oriented toward a local urban community

   --- Leadership - appears to be the most likely limiting factor. It usually grows out of "in place" community structures that originally developed to serve summer tourists. Usually hospitality operators play key leadership roles.

   The anatomy of this new type of winter sports area is graphically illustrated as in figure 1.

3. Hospitality businesses are themselves a major necessary ingredient to most participants in dispersed winter recreational activities. Their contributions may be thought of as three-fold.

   --- Just as resorts provide access to the natural resources of water and woods for summer vacationers so do hospitality firms make possible access to the winterscape for snowmobilers and cross-country skiers. Without hospitality services most participants would be limited to one-day trips and many would be uncertain of their access points.

   --- They supply an important part of the winter experience. Apres ski is recognized as a major part of the downhill experience, similarily the friendly warmth of the lodge, its amenities and comaraderie of friends has an appeal that extends well beyond the active outdoor aspects of winter vacationing.

   --- Key leadership - roles are often performed by hospitality entrepreneurs. Many dispersed winter recreation areas owe much of their ongoing development and management to the enlightened self-interest of one or a small number of business men.

Figure 2. Factors in the Production of Winter Recreation Experiences.

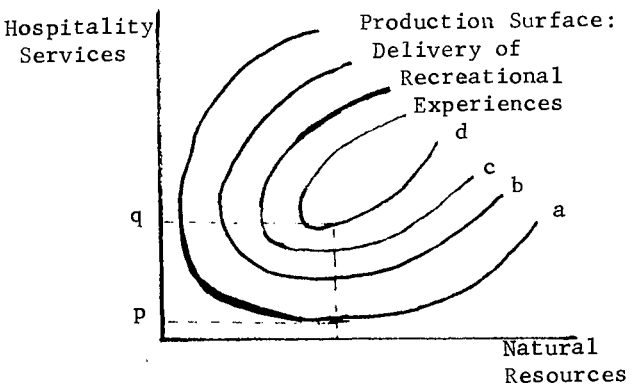
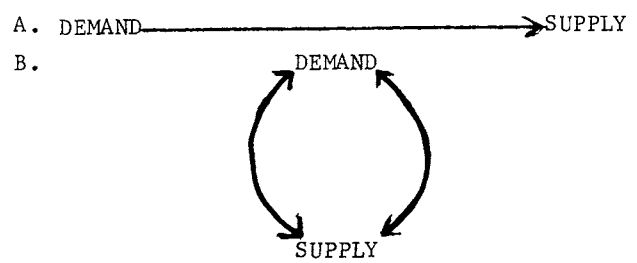


Figure 2 illustrates the manner in which hospitality services operate as a factor in the delivery of recreational experiences along with and in support of natural resources. Here hospitality services are measured on the vertical axis and natural resources measured on the horizontal axis. The iso-product lines represent the delivery of recreational experiences (in person days, dollars, or satisfactions on the part of participants). They may be thought of as forming a production surface arising above the other two axes at levels indicated by the symbolic letters a, b, c, d. It will be observed that with a fixed level of natural resources, recreational experiences at the level of 'h' can be realized with a quantity 'p' of hospitality services. But with the same level of natural resources, recreational experiences can be at the level of 'd' with quantity '2' of hospitality services.

4. Can supply and demand for dispersed winter recreation be interractive upon each other? Thus far it has been implied that service areas for dispersed winter recreation arose as a reactive supply response to the demand for snowmobiling and cross-country skiing. This is illustrated in figure 3A. But are we now approaching the point at which Say's law can become operative? That is, where the supply can function to generate additional demand? Many recreational complexes have depended upon demand creation through promotional and sales devices. It could well be that healthy clusters of hospitality businesses may become major factors in continued expansion of dispersed outdoor winter recreational activities. In this case supply and demand can become interractive as illustrated in figure 3B.

Figure 3. Can There be Dynamic Demand-Supply Interraction?



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WINTER RECREATION VISITOR STUDY - WISCONSIN

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There is a need for a strong year-round recreation-tourism industry. The individual recreation-tourism business needs it to earn a decent income and a reasonable return on investment in the business. The community needs it to maintain employment throughout the year, especially those communities where recreation-tourism is a major part of the local economy. Many small communities across the snowbelt have decades ago developed summer recreation-tourism facilities, and now with snowmobiling and nordic skiing becoming popular, have an opportunity to offset rising costs and changing trends in recreation activity participation.

Effective promotion is vital to the building and maintaining of a strong, year-round industry. Such effective promotion requires knowledge of the tourist and the potential tourist. Where do they come from? Who are they? When do they make their travel plans? What do they do when they get to their destination? Why did they choose a particular destination? How much do they spend? Answers to these kinds of questions will enable an effective promotional program to be planned and implemented.

Its' just like having a birthday party for your son or daughter. You have to invite some guests, or nobody will come. Advertising in the wrong areas, at the wrong time, to the wrong persons is the same as, or worse, than not advertising at all, or not inviting them to your party. Such information is also useful for planning new developments or expansion of existing facilities.

In order to provide such information on the winter recreation visitor to Wisconsin, the Upper Great Lakes Regional Commission helped fund a study which included responses from 1,850 overnight winter visitors to selected areas during December, January, and February of last winter. Highlights of some of the findings, related marketing implications and ecomomic impact make up the rest of this report. What we learned, was as expected in some cases, and surprising in others.

They came from relatively close in. The average distance traveled was about 220 miles. A little under 40 percent traveled under 200 miles; 30 percent traveled 200-250 miles; and almost 75 percent traveled less than 300 miles. The implication is to advertise close in, where the bulk of the visitors are coming from. The major areas of origin were Chicago, Milwaukee, Twin Cities, Green Bay, Madison and Rockford.

We also learned the winter tourist is affluent. Family income for snowmobilers averaged $26,900 while cross-country skiers averaged $30,800, compared to the North Central U.S. average of $18,700. Likewise, occupations of nordic skiers were predominantly professional-technical, while snowmobilers were spread between professional-technical, managers-proprietors, craftsmen-foremen-skilled workers, and homemakers.

With that kind of purchasing power they spent a lot also. Snowmobilers spent $479 per party per trip, while nordic skiers spent $246. Nordic skiers in Wisconsin have a reputation for being small spenders. However, this difference is due in large part to the longer length of stay (4.0 vs. 3.1) and size of travel party (6.3 vs. 4.5) of snowmobilers. On a per person per day basis the numbers are $19.00 and $17.65, respectively.

One-half of the winter tourist dollar was spent on lodging in Wisconsin, and 30 cents was spent on eating and drinking. The next largest expenditure category is snowmobiles, with 18 cents of the dollar spent, on the average. Naturally a relatively small number of snowmobile purchases can raise the average expenditure with large individual purchases. Nine cents was spent on gasoline, four cents in food stores, three cents each on auto and related, and clothing, and two cents each was spent on liquor store purchases, skis, and souvenirs.

The resulting economic impact is correspondingly substantial. For example, at the above spending levels, 1,000 parties each of snowmobilers, nordic and alpine skiers would spend $1,088,290 in an area. Using a multiplier of 1.7 indirect spending would amount to $761,093 for total direct and indirect spending of $1,850,093.

Further, if we assume a third of this spending goes into payroll, and average adult income in

the community is $10,000, 185 jobs would be supported by those 3,000 travel parties. Such information is indeed significant when discussing the importance of this industry to local and county government leaders.

They also travel as part of a larger group much of the time, so advertising to snowmobile and ski clubs would merit consideration. Another very important finding was the large amount of planning ahead for the winter recreation trip. Snowmobilers averaged eight weeks in planning ahead, with 42.5% planning over three months in advance. Nordic skiers planned an average of 7.4 weeks in advance.

A surprising finding was the considerable amount of participation in more than one major recreation activity while on the trip, by members of the travel party. Therefore, for a particular region to be most attractive, it appears facilities for all three major winter recreation activities ought to be offered.

Furthermore, facilities for such activities ought to be of the highest quality possible. High quality and a variety of recreation facilities were often stated as reasons for choosing a particular destination. You don't have to do a study, if you are a participant, to recognize the importance of quality in winter recreation facilities. Well groomed and well-marked trails are critical to making the visitor feel satisfied with the recreation experience. If satisfied they will tell others, the cheapest way of getting the invitation out to new customers.

Likewise, advertising should convey an image of high quality facilities. A word of caution--such advertising should honestly reflect the quality level, as nothing turns off a tourist faster than having a trail facility advertised as well groomed, only to find dead trees over the trail and other signs that years have passed since the last grooming.

Activities other than outdoor recreation are used by visitors, if available. Eating and drinking out are very important in Wisconsin, so we must make sure restaurants are open where the tourists want to eat. It's just as important as lodging facilities in enabling people to visit and stay in an area. Swimming, sauna, and whirlpool are also used when available. Shopping is another activity to keep people doing things and enjoying themselves.

The market is there. What we have to do is identify our potential guests, and offer what is wanted--high quality and variety of activities. Well groomed and marked trails will certainly enhance the successfulness in building a strong year-round tourism business. Know your product, know your customer, what they like, know when to invite them, and where they live (who, what, when, where). Knowing these things, send out your invitations, and you'll have a good party, a fantastic one in fact.

U. S. FOREST SERVICE & PRIVATE SKI TOURING CENTERS
A SYMBIOTIC RELATIONSHIP

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INTRODUCTION

The Green Mountains of Vermont are a place where people from New York, Massachusetts, Connecticut, New Hampshire, and many other states come to partake in the sport of Nordic (cross-country) skiing. The Middlebury Ranger District of the Green Mountain National Forest administers approximately 60,000 acres of this highly desirous cross-country ski terrain. The National Forest ownership, however, is interspersed among ten Vermont towns with approximately 55% of the land being privately owned.

Currently, there are four Nordic Ski Centers located within the boundaries of the Middlebury Ranger District. The buildings, lodges, etc. associated with the Centers are located on the private lands and some 40 plus kilometers of the Center's trails are under a special land use permit from the Forest Service. The permits are administered by the District Ranger.

Other than the Nordic Ski Centers, the District has one Cooperative Agreement for a ski trail with a ski club, 6 cooperative agreements with snowmobile clubs, four to six private operations currently being placed under "Outfitter Guide" special use permits, and one recreation event permit for a national cross-country ski marathon. Two alpine ski centers also operate within the boundaries of the District but do not have runs on National Forest lands.

The demand for winter use of the Green Mountain state is rapidly increasing. Though it appears that winter recreation use on the Middlebury Ranger District is heavy, the District is only a small portion of the State where this type of use occurs. Ski trails were first developed in Vermont in the 1930's. According to a recent ski article, if all the existing ski trails were laid end to end, they would run from the Atlantic Ocean to a point west of Denver.

Today, the expertise, equipment, and general world of Nordic Skiing is in the phase of development that Alpine skiing was a few years ago. The National Ski Touring Operator's Association, places Nordic Skiing today where alpine skiing was in the late 1950's.

The demand is very realistic and is here for dispersed winter recreation activities. If the National Forest and adjacent private Nordic Center, Ski Clubs, Snowmobile Clubs, etc are going to meet the public demands, it must be done in a cooperative spirit. This cooperative relationship is a true symbiotic relationship -- the private lands offer the Centers and facilities on the small tracts while the National Forest provides the continuous land base of the quality trails. The National Forest's objective of dispersed recreation is complimented, the private entrepreneur is successful, and a public recreational demand is met. The roles, opportunities, use of various permits, and planning needs of both parties concerned are discussed in order to show the need for this special relationship.

ROLES

Forest Service policy requires that the National Forest be more than just a place to grow trees -- multiple use must occur and does occur within the Forest. Recreation has long been recognized and the National Forests are the largest supplier of public outdoor recreation in the United States with over 2.7 billion hours spent by the recreating public. The National Forest system is comprised of areas of beauty and diversity, yet, closely located (within 200 miles) to ninety-five percent of the American people. In comparison to all lands administered by Federal agencies over fifty percent of the outdoor recreation occurs on National Forest land.

The Forest Service role in outdoor recreation is to provide the people of the United States a place where they may see and enjoy nature and a place where they can spend their leisure time. The opportunities will be in the form of non-urbanized developed facilities and dispersed act-

ivities which would include wilderness and visual and cultural values. The job of the professional manager is to diagnose the agencies position and strategies and to deal with the major forces of social changes -- average older age (35), energy declines (less mobile public) and a changing attitude of the country in political and social views. It involves recognizing the other associated concerns, both private and public. Likewise, "Recreation" is only one of the five "uses" that must be integrated with wood, water, wildlife, and range.

The private sector's role is a very important facet of the Nordic Ski setting. As the sport grows, so do the demands, and the private sector must keep abreast of the demands. Currently, this includes sophisticated trail management (summer and winter), complete rental and retail departments, ski schools, lodging and meals, parking facilities, and the sponsoring of activities such as clinics, guided tours, races, and school programs.

OPPORTUNITIES

We are dealing with several major forces which are producing social change -- the average age of the population of the United States will be 34 by the year 1985; as the availability of natural energy declines, so does the mobility of our society; and the political and social views of the country are changing from "carefree" to one that is concerned about how and why things are done in a certain manner. The greatest of these impacts will most likely be the energy crisis. We are, however, in an age of leisure and as leisure time increases, so does the need for recreation opportunities. Therefore, even though available energy decreases, society will not sacrifice the benefits of outdoor recreation. It is essential that managers consider the energy efficiency of recreational activities. Cross-country skiing will pass the energy test much more quickly than most other winter activities. Also cross-country skiing will meet the trend of a more physically fit society.

The opportunities are right for the public and private development of trail networks and cross-country centers. We must be atune to the timing and need of society and reflect its forces in planning.

PLANNING

Forest land planning is currently being undertaken by the Green Mountain National Forest. The National Forest Plan will set direction for many years to come and should not be taken lightly by the general public or the private entrepreneur -- in this case, the Nordic Ski Center owners and/or operators. Likewise, as land manager for the Ranger District, it is essential that all aspects of planning be explained and incorporated into the Forest Plan. Important examples of planning input would come from SCORP Plans, regional and local planning commissions, the recreation user and private enterprise.

There is an irreversible trend in the four seasons of recreation according to Tocher, Dana Professor of Recreation, University of Michigan. Cross-country skiing is leading this trend and is not considered a "fad". Major concerns associated with the trend are -- public safety, conflict between uses, protection of private property, and reduction in private land base available for recreation. The way to recognize this trend is in "planning". We have to inventory what currently exists in trails, centers, demands, and predict trends and how they will interrelate with these concerns.

We are having to reanalyze our recreation program to reflect the vast changes in Nordic skiing. The privately owned Nordic Centers are adjusting their management plans accordingly, both reflecting complimentary roles.

SPECIAL LAND USE PERMITS

The special land use permit is an instrument used to authorize and regulate National Forest land for private use or where the public is charged for a service furnished by private enterprise upon National Forest land.

Three types of special use permits are used on the Middlebury Ranger District in association with Nordic Skiing. A "term" permit is issued to the Centers for the development of trail networks on National Forest land. The permit, through special clauses, spells out the requirements for insurance, trail design, safety, environmental protection, and other needs. Because Nordic skiing and its philosophical basis are in a developmental era, many changes are occurring in the administration of the permit. The changes such as trail specifications, signing, grooming, etc., are a result of working with the Nordic Centers and the public to determine trends and needs. By working together, we can recognize the changes, and adjust the permit requirements. Thus, the Centers gain from a more desirous, up-to-date product and the District is a little further down the road in meeting its objectives on dispersed recreation.

A second type permit associated with cross-country skiing is a "Recreation Event" permit. The Hennessy Cognac cross-country ski marathon is a prime example. This is a production by the USSA, three Nordic Ski Centers, and communities resulting in a volume of coordination through a "Recreation Event" permit issued at the District level.

Currently, we are working with four to six potential "Outfitter Guide" permits involving Nordic skiing. This type permit is used where a guide accompanies the skiers for a fee.

The use of "Cooperative Agreements" and/or "Memorandums of Understanding" should increase greatly for new cross-country trail construction and maintenance. The availability of "marked" or "maintained" trails is limited where there is not an associated fee. Our job, the Ski Club and District, is to compliment the Ski Center fee trails with a non-charge system. The Nordic Centers do not see this as a conflict, but as asset to the total cross-country ski activity.

Again, whether it is a special use permit or a memorandum of understanding, the District must be sensitive to the changes and needs of the permittee. Conversely, the permittee should thoroughly understand the objectives of the National Forest -- the public's land.

CONFLICTS

Conflicts are forever present when the District is managed under a "multiple-use" concept. It is important for all parties involved in the "multiple uses" to understand the needs of each other. To illustrate, the personnel of the Ranger District cannot prevent the conflicts, but can present alternatives and show where the benefits lie. Example: alternate trails have been constructed by District YACC crews where a logging operation is to pre-empt skiing on the old skid road. Untimately, by properly closing the skid road upon completion of the logging activity, the trail used by the skier will most likely be in better shape than prior to logging.

Snowmobilers and skiers were in conflict, but now the two work together to reconstruct bridges, rebuild trails, and even to jointly sponsor special events.

It is imperative to keep all interested parties aware of the District's programs and projects. A free use firewood area may need to use the cross-country ski trail in the summer, or a deer winter yard must be recognized so as not to locate a ski trail through it. Two way communication between various groups along with a mutual understanding of the relative position of each can eliminate or greatly reduce conflict.

THE SYMBIOTIC RELATIONSHIP

The interdependence inherent in a symbiotic relationship is evidenced in a number of ways when one examines the interaction between the Forest Service and the cross-country permittee.

First of all, the private entrepreneur provides an opportunity within the National Forest boundary for an activity that is in demand and that is desired by the agency. Yet without the entrepreneur the Forest Service would be less likely to be able to provide the full service needed. With the increased budget and personnel constraints, it is a matter of looking at the alternatives. The private entrepreneur can manage a permit area as an economical venture, thus the demands of the activity are met, the Forest Service dispersed recreation objective complimented, and the Forest Service can avoid competing with the private sector. Otherwise, the activity on National Forest lands would consist of a trail system at far less than demanded or desired.

Secondly, the private sector must, out of necessity, turn to public land in order to consolidate a useable network of trails and/or facilities. Even at the most efficient and simplistic level, dealing with a public agency is a challenge. When dealing with a checkerboard pattern of land ownership, however, touring centers sometimes find it just as hard (and sometimes harder) to deal with numerous private landowners (who may be absentee and hard to find or deal with, noncooperative, or highly restrictive). The Forest Service is a known quantity which tries to function in a consistent manner under established guidelines. Hence, the special use permit aids the entrepreneur in establishing a land base from which to begin and continue his/her business.

Thirdly, both parties to a special use arrangement benefit from the knowledge that they can gain from one another. Expertise in trail construction, trail maintenance, safety, design standards, and facility operations can be passed on to the permittee through the contents of the permit itself, the yearly review of the safety plan, and informal contacts yearlong pertaining to administration of the permit. Equally important is the flow of information back to the Forest Service: personal experiences and first hand knowledge acquired by the operator, permittee involvement in local and national ski association meetings, and permittee creativity. The interchange is pertinent because both parties must react to the unique features of the terrain and area involved. Such interplay allows room for experimentation and discussion of results.

In a true symbiotic relationship neither interacting party harms, or can afford to harm the other. The permittees cannot afford to disregard the stipulations of his/her permit and abuse the privileges afforded. Termination of the permit could ultimately occur. Likewise, the Forest Service must be reasonable in the

demands it places on the permittee. It must not only work with the permittee to assure adherence to standards and requirements, but it must be sensitive to the economic and time constraints a business faces. The relationship thrives only if both sides benefit.

SUMMARY

In dispersed recreation management, the Ranger District depends upon a symbiotic relationship with its Nordic Ski Centers and vice versa. Through coordination of recreation opportunities on National Forest and private lands, complimentary roles exist to sustain a quality environment in which people reside, work, and recreate, it is essential to maintain this high degree of coordination and involvement between public and private programs.

Working together is the way to meet the need.

ACKNOWLEDGMENT

I would like to thank Norman Noyes, Forester, Middlebury Ranger District and Anthony Clark, owner and operator of the Blueberry Hill Cross-Country Ski Center for their input and review comments.

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INTERRELATIONSHIPS AMONG THREE OUTDOOR WINTER SPORTS

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INTRODUCTION

Cross-country skiing is one of the fastest growing outdoor recreation activities in the United States (USDI 1978; Nielsen 1979). Its emergence follows closely on the heels of downhill skiing and snowmobiling as part of a general increase in outdoor winter sports activity. The 1977 Heritage Conservation and Recreation Service (HCRS) national telephone survey ranks cross-country and downhill skiing as the two fastest growing activities with snowmobiling ranked fifth (USDI, 1978 - Table II-1). These three activities also rank among the top ten in potential growth.

With substantial increases in the numbers of winter sports enthusiasts and corresponding increases in facility development, equipment sales, and services the winter sports market has become an important one. The dynamics of the winter sports market has raised a number of important questions. Have snowmobiling and downhill skiing reached their peaks? What will be the impacts of energy costs and availability on these two activities? How fast is cross-country skiing likely to grow in the future and how large is the potential market? How will cross-country ski growth affect downhill skiing and snowmobiling, if at all?

An understanding of the interrelationships between alternative winter activities is essential to the prediction of growth in cross-country skiing and the likely impacts of such growth on other winter activities. The concepts of substitutability and complementarity of outdoor recreation activities may be helpful in directing study of winter activity interrelationships.

COMPLEMENTARITY AND SUBSTITUTABILITY

Research into the substitutability of outdoor recreation activities has been advocated by Hendee and Burdge (1974), but progress has been limited (Burdge et al, 1978, Christiansen and Yoesting, 1977) and methodological problems have been noted (Beaman, 1975). Both economists and sociologists have independently attacked the substitutability concept.

Economists have formally defined complementarity and substitutability using demand and utility curves. Two goods are complements if an increase (decrease) in the consumption level of one increases (decreases) the relative desirability to the consumer of the other. If the relationship is an inverse one we say the two goods are substitutes. These definitions may be quantified using marginal rates of substitution or defined in terms of utility curves (See Leftwich 1976, pp 72-79 and 106-122). Advantages of the economic approach are that the terms are well defined, concepts are quantifiable, and analysis begins with the simple case of two goods.

The formal economic definitions of substitute and complement, however, do not capture all of the meanings we wish to impart. This is largely due to the focus on goods, independent of the needs which goods satisfy. Lancaster (1966) notes that by assuming away the intrinsic characteristics of goods, traditional economic analysis can make only limited contributions to complement-substitute questions.

Where economists have often oversimplified these concepts, sociologists have made them overly complex. The substitutability concept within recreation has been attacked via the equally problematic definition of "activity packages". Recreation researchers have tended to deal with too many variables and activities at a time and to employ statistical overkill techniques like factor analysis. The sociological approaches of Driver and Knopf (1977) and West (1977) seem to offer more promise for increased understanding of recreation activity interrelationships.

Lancaster (1966) provides a modification of traditional economic theory capable of linking

sociological and economic approaches to substitution. His theory is based upon three assumptions: (Lancaster 1966, p. 134)

1. The good (activity), per se does not give utility to the consumer; it possesses characteristics, and these characteristics give rise to utility.
2. In gereral, a good will possess more than one characteristic, and many characteristics will be shared by more than one good.
3. Goods in combination may possess characteristics different from those pertaining to the goods separately.

Study of substitution and complementarity should then be based upon 1) an examination of the characteristics of the goods (recreation activities) and 2) identification of consumer preferences for various combinations of characteristics in question. It is well recognized that recreation activities are complex goods possessing a variety of different characteristics which yield utility (satisfactions). Consumers are not homogeneous in their perceptions of recreation activities or the importance they assign to various characteristics.

We have come to realize that there are many different products that are included under the generic labels "camping", "boating", "fishing", or "skiing". Perceptual studies and market segmentations have identified a great diversity in consumer views of these "products" and have shown that the same activity may fulfill quite distinct needs for different individuals or even for the same individual under different circumstances. For these reasons, statistical manipulations of general recreation participation data does not appear to be a promising approach to understanding substitutability.

Better understanding of substitutability and complementarity will require joint efforts by sociologists/psychologists and economists. The former have focused primarily upon the characteristics of recreation activities and the needs and wants that are satisfied by them. Economists tend to focus more upon the inputs or costs of participating in recreation activities (ie. travel costs, time costs, equipment costs and fees), since outputs (or benefits) have proven more difficult to quantify. Recreation participation decisions clearly depend upon both benefits (or satisfactions) and costs (or requirements). Hence, both must be included in any comprehensive examination of substitution.

Definition of terms

An important prerequisite to advancement of our understanding of substitution is a clear definition of the term. Although the economic definition is clear, it is not the one used most often within outdoor recreation. Depending upon how the terms "substitute" and "complement" are defined, different behavior patterns will be interpreted as involving a substitution, and different activities may be labeled substitutes or complements. Researchers need to clarify the meanings of these terms, or at least recognize the ambiguities in them.

In a multivariate setting, a number of different types of "substitutions" must be recognized. A formal model of consumer behavior is necessary to formally define the concepts of substitute and complement. If one rejects the economic model, one must propose an alternative. The Lancaster (1966) model seems to be the most promising for application to outdoor recreation. Since a theoretical discussion of substitution and development of formal definitions of the concept are beyond the scope of this paper, we shall proceed to applications to winter sports and use the term in a loose and broadly understood sense.

EXPLORING RECREATION ACTIVITY INTERRELATIONSHIPS: FOUR SIMPLE APPROACHES

There are four research avenues that can contribute to our understanding of outdoor recreation activity interrelationships. These are briefly discussed below, roughly in order of increasing complexity. Data are then presented to illustrate applications to the winter sports market.

Examination of overlaps in recreation activity. The numbers of participants that any two activities have in common will in some sense tell us how close or far apart the two activities may be. This type of analysis is based upon an assumption that activities with many participants in common are more likely to have common entrance requirements, fulfill common needs and wants, or to be complements. Activities with mutually exclusive sets of participants probably have different entrance requirements or fulfill quite different needs.

Comparisons of participant socioeconomic profiles. If socioeconomic variables are good predictors of outdoor recreation participation, they should also be useful in predicting substitutions. There is already a wealth of descriptive information about various recreation activity groups. Comparisons of these participant profiles should yield some insights into interrelationships between activities. The assumption here is that by virtue of an individual's age, income, sex, occupation, location, marital status, etc. he or she will be differentially attracted to various recreation activities. Activities with similar participant profiles are therefore more likely to be either complements

or substitues, than activities with quite different profiles.

Comparisons of activity characteristics. This approach turns the attention from the consumer to the product (activity) itself. Defining activities based upon price, accessibility to consumers, needs which they satisfy, physical requirements, or other attributes begins to operationalize the Lancaster model. The assumption here is that activities with similar characteristics will be substitutes and activities with complementary characteristics will be complements. Two sub-approaches are possible; research may focus on actual measured characteristics of activities, or on perceived characteristics and product images.

Analysis of observed or reported shifts in recreation activity participation. Economic definitions of substitution and complementarity are based upon observed consumer behavior patterns. Instances of dropping one recreation activity to pick up another or decreasing frequency of participation in one to increase activity in another indicate possible substitutions. Surveys which measure reasons for changes in recreation activity patterns shed additional light on substitution/complementarity.

An important purpose of research into substitutability of recreation activities is to improve predictions of patterns of change in outdoor recreation participation. The above approaches are advanced as simple and straightforward techniques that will contribute to this end. It should be noted that a combination of these four types of analysis will yield a more comprehensive picture than research that employs only a single approach.

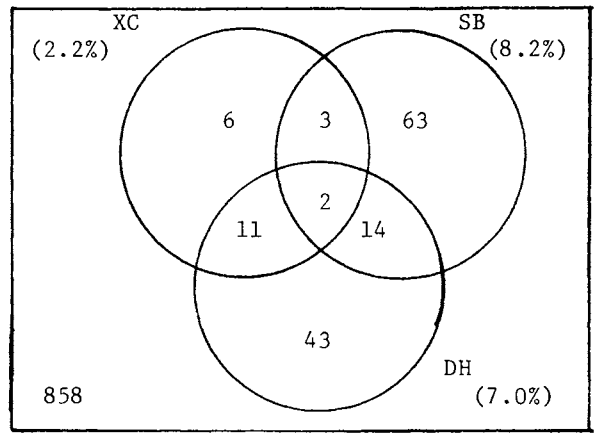
These approaches will be more understandable to decisionmakers and planners than more complex approaches like factor analysis, and should yield more immediate and practical results. The remainder of this paper illustrates the application of these four categories of research to the study of interrelationships among downhill skiing, cross-country skiing, and snowmobiling.

APPLICATION TO DOWNHILL SKIING, CROSS-COUNTRY SKIING AND SNOWMOBILING

Overlaps in Winter Sports Participation

The Venn diagram (Figure 1) graphically depicts overlaps in winter sports participation as measured in the most recent HCRS national telephone survey (USDI, 1978). About 14% of the national sample 12 years of age and older participated in at least one of the three winter sports during the previous year. The vast majority of these winter sports participants (79%) participated in only one of the three activities;

Participants per 1,000 people



XC = cross-country skiing
DH = downhill skiing
SB = snowmobiling

Figure 1. Venn Diagram of Participation in Winter Sports

twenty percent took part in two of the three; and only one percent were active in all three sports.

Snowmobiling is the most popular of the three activities (8.2% of the population participating) followed by downhill skiing (7.0%) and cross-country skiing (2.2%). Further analysis of the Venn diagram yields the percent of each winter sport subgroup participating in each of the other winter sports (Table 1). With only two exceptions, we find about twenty percent of the participants in each activity participating in the other winter activities. For example, 19% of downhill skiers cross-country ski, 22% of cross-country skiers snowmobile, and 19% of snowmobilers downhill ski. Cross-country skiing is responsible for the two exceptions; only six percent of snowmobilers cross-country ski, and sixty percent of cross-country skiers also downhill ski.

Dividing the table entries by the population participation rate for each activity controls for the differences in general popularity of the three sports. The resulting figures reveal a much stronger linkage between the two skiing sports than between snowmobiling and skiing. Participants in each type of skiing take part in the other skiing sport at a rate 8.6 times the participation rate of the general population. Multipliers between snowmobiling and the two skiing sports are more modest, all lying between 2.3 and 2.7.

Table 1 -- Winter Sport Participants Activity In Other Winter Sports

Winter Sport Subgroup	Percent participating in XC	DH	SB
Cross-Country Skiers (XC)	100	60 (8.6)[a]	22 (2.7)
Downhill Skiers (DH)	19 (8.6)	100	19 (2.3)
Snowmobilers (SB)	6 (2.7)	19 (2.7)	100
General population participation rate	2.2	7.0	8.2

[a]Figures in parentheses are ratios of subgroup participation rates to the general population participation rate. For example, cross-country skiers participate in DH skiing at 8.6 times the rate for the national population (8.6 = 60/7.0).

SOURCE: Analysis of data tapes for the 1976 HCRS National telephone survey.

It should be noted that analysis of other recent survey data yields comparable results. For example, a 1977 survey of adults in north-eastern households (Bevins, 1979) reports about 20% of the sample participating in downhill skiing, cross-country skiing, or snowmobiling. Of these participants, 75% take part in only one of the three activities, 20% take part in two, and about 4% participate in all three. Although participation rates are slightly higher than national figures (SB = 9.2%, DH = 12.3%, XC = 4.3%), overlaps between activities are comparable to the national percentages. Multipliers fall between 2.6 and 2.8 for comparisons of snowmobilers and skiers and the multipliers for the two skiing sports are both 4.4.

This analysis of overlaps in winter sports activity suggests three simple conclusions.
(1) Participation in one winter sport increases one's liklihood of participating in other winter sports.
(2) Ties between the two skiing sports are stronger than ties between snowmobiling and either skiing sport.
and (3) Compared with the general population, snowmobilers, as a group, do not favor one skiing sport over the other; and neither group of skiers is more predisposed toward snowmobiling.

Socioeconomic Characteristics

Numerous studies have measured the characteristics of downhill skiers (eg. LaPage 1979, Stynes and Mahoney 1980, Leuschner and Herrington 1971) and snowmobilers (see Stynes and Szcodronski in these proceedings). Profiles of these two recreational groups are fairly well known and have proven quite stable over time and space.

Until recently, cross-country skiers as a group were too small in numbers to reveal statistically reliable socioeconomic profiles in national outdoor recreation participation surveys. There is a great deal of variation in cross-country skier profiles that have been reported to date. Most of these have been based upon small on-site surveys using inconsistent sampling techniques. Perhaps the best national data on both downhill and cross-country skiers is provided by the 1978 National Skier Marketing Survey (LaPage, 1979).

It is clear that snowmobilers as a group are quite different from skiers. Snowmobiling is predominantly a blue collar, rural, family activity. Most participants have medium or high incomes and the majority have not received formal schooling beyond high school. Age and sex profiles are somewhat less clear due to the preponderance of surveys of snowmobile owners. These studies suggest snowmobilers are predominantly male and consistently report an average age in the low forties. (See Stynes and Szcodronski for references).

Surveys of snowmobilers, as contrasted with snowmobile owners, are fewer in number and yield a somewhat different profile. The 1977 HCRS National telephone survey of outdoor recreation participation reports that 55% of snowmobilers are male and only 25% are over 35 years of age. In fact, the age distribution for snowmobilers measured in that survey is not significantly different from the age distributions for downhill and cross-country skiers (USDI, 1978).

Skiers have consistently been found to be young, highly educated, and from high income families. High school and college students make up over a third of all skiers. White-collar occupations predominate with significant numbers of professionals. Contrasted with snowmobilers, skiers include more singles and are predominantly from urban and suburban areas.

Until recently household surveys did not distinguish between cross-country and downhill skiers. Several surveys have now begun to differentiate these two skiing sports and a few differences in socioeconomic profiles have begun to appear. Cross-country skiers are more similar to downhill skiers than to snowmobilers. This is partially due to the fact that 60% of cross-country skiers also downhill ski.

LaPage (1979) found skiers who only cross-

country ski to be different from downhill skiers. They include greater percentages of females, middle income families, and participants over 30 years of age. Cross-country skiers are even more highly educated than downhill skiers with one in four having some graduate training. Cross-country skiers also include larger percentages of married participants. Spotts (1980) found similar differences in a survey of Michigan skiers.

Another method of stereotyping winter sports participants is to examine their non-winter activities. Two recent general outdoor recreation participation surveys (USDI, 1979 and Bevins et al. 1979) indicate that alpine skiers have a greater tendency to participate in tennis, motorboating, motorcycling, and waterskiing than nordic skiers. Cross-country skiers show high participation rates in "environmental" activities like canoeing, backpacking, fishing, and hiking. Snowmobilers are generally less active in outdoor recreation activities with the exception of picnicking, hunting, recreational vehicle camping, and motorcycling. Snowmobilers are closer to downhill skiers in their interest in more developed and motorized recreation and closer to cross-country skiers in a more rural orientation.

It should be noted that data on cross-country skiing is limited at this time. While downhill skiing and snowmobiling have stabilized to some extent, cross-country skiing is growing rapidly and both the numbers and types of participants may be expected to change in the next few years.

The introduction of waxless skis, trail development, and growth of cross-country ski resorts is already changing the image of the sport and the types of people who participate. We might expect a number of different cross-country ski market segments to develop in the future covering a broad spectrum of socioeconomic groups and interests. Of the three winter sports examined here, cross-country skiing appears to have the widest potential appeal, suggesting that by 1985 it may outdistance both downhill skiing and snowmobiling in numbers of participants.

In summary, socioeconomic profiles are consistent with information on overlaps in participation. The two types of skiers are similar to each other, while snowmobilers as a group are quite different. Cross-country skiing appears to have a comparative advantage in its appeal to a broader spectrum of socioeconomic groups. Future growth of both snowmobiling and downhill skiing may be limited by income requirements and status barriers (West, 1977).

Characteristics of the three winter sports

While researchers recognize the importance of the characteristics of recreation activities, there have been few studies that formally include such variables in predicting winter sports participation. In comparing cross-country and downhill skiing, there is general agreement that the former is less expensive, easier to learn, less crowded, and requires less travel. These attributes suggest a possible comparative advantage, indicating the possibility of some substitution between the two skiing sports.

On the other hand similarities in the two sports could also result in complementarity. Some skiers may develop their skills in cross-country skiing and then move on to downhill skiing. As more and more downhill ski resorts offer cross-country trails, skiers may participate in both, moving to the cross-country trails when downhill facilities become too crowded. These hypothesized behavior patterns suggest possible complementary relationships.

Snowmobiling shares a common function with cross-country skiing, traveling cross-country during the winter, but the motorized nature of snowmobiling has tended to attract a different type of participant. Costs of snowmobile equipment exceed those of downhill skiing, and restrict entry to the sport. Those snowmobilers who are more attracted to the opportunity to "commune with nature" during the winter than to the machine itself should find cross-country skiing a potential substitute.

Marketing research suggests that in consumer decisionmaking perceived characteristics and images of winter sports may be as important as actual characteristics. Several research studies have measured consumer perceptions of skiing and snowmobiling.

Perceptions

Driver (1976) compared the perceptions that snowmobilers and cross-country skiers have of each other's sports. Cross-country skiers perceived their own sport to be physically active, a good way to experience the outdoors, quiet, and ecologically okay. Snowmobilers held somewhat weaker, but quite similar perceptions of the sport of cross-country skiing.

In contrast, the perceptions of snowmobiling by the two groups were almost totally opposite. Cross-country skiers had largely negative views of snowmobiling while snowmobilers held largely positive images of their own sport. Perceptions of the two groups were almost at opposite ends of the semantic differential scale for items like "ecologically okay", "physically active", "a sport for everyone", "done by considerate people", and "a good way to experience the outdoors".

Since the samples were small and cross-

country skiing was still in its infancy, these results should be interpreted cautiously; however, they suggest that unless these images change substantially, switches from snowmobiling to cross-country skiing seem far more likely than vice versa.

The U.S. Forest Service's National Ski Market survey (LaPage, 1979) and a comparable study in Michigan (Stynes et al., 1980) examined images of downhill skiing. These surveys measured perceptions held by not only active skiers, but also potential and inactive skiers. This type of design yields useful information about participation, adoption, and dropout decisions. Images held by non-participants are important as these suggest obstacles to participation and give clues to possible substitutes.

About half of the national sample cited cost of downhill skiing as keeping them out of the sport, restricting participation, or causing them to drop out. Most respondents agreed with statements that skiing requires both physical fitness and skill. Skiing was seen as a good family activity.

Michigan skiers were more concerned with crowding than the national sample. Agreement that downhill skiing is crowded increased from 52% for potential skiers, to 63% for inactives, to 72% for dropouts. Significant numbers of respondents cited crowding as a reason for not skiing (15% of potentials, 27% of inactives, and 31% of dropouts). More than half of the sample agreed that skiing is expensive, and requires large amounts of free time and travel. Potential skier's perceptions of downhill skiing included agreement with statements that skiing requires large investments in equipment (46%), is expensive (40%), requires large amounts of free time (30%) and is dangerous (20%).

Cross-country skiers in the sample had a greater tendency to view downhill skiing as crowded, expensive, dangerous, and requiring considerable time and travel. These images support hypothesized substitution from downhill to cross-country skiing in the future. Perceptions of cross-country skiing are needed to round out the picture.

Switching Patterns

Actual changes in outdoor recreation activity participation from one year to the next is the most concrete evidence of possible substitutions. Since research has only begun to measure changes in recreation activity patterns, there is not much data that is well-suited for direct analysis of substitution.

Bevins (1979) measured a considerable amount of change in outdoor recreation activity patterns in the Northeast, including changes in frequency of participation, changes in location, and adoption of new activities. Analysis of changes in winter sports participation reported in this survey yields evidence of some substitution from downhill skiing to cross-country skiing, as well as some complementarity between the two skiing sports. The data also reveals net substitutions from snowmobiling to cross-country skiing, and to a lesser extent from snowmobiling to downhill skiing.

The Michigan skier market survey explored substitution using direct questions. Thirty-eight percent of cross-country skiers (84% of whom also downhill ski) responded that their cross-country ski participation had influenced the extent of their downhill ski activity.

CONCLUSIONS

While there is a great deal of missing and incomplete evidence, the cumulative weight of research points to significant potential for growth in cross-country skiing over the next decade. The comparative advantages of this sport indicate the possibility for substantial numbers of new participants, as well as converts from downhill skiing and snowmobiling. The relative youth of cross-country ski facility developments, trends in gasoline prices, and an aging population structure, suggest that cross-country skiing's comparative advantage is likely to increase in the coming years.

Relationships between snowmobiling and cross-country skiing are weaker than relationships between downhill and cross-country skiing. Possible complementarity between the two skiing sports will depend a great deal on future trends in the supply of skiing facilities and the characteristics of the two sports.

The four approaches to the study of activity interrelationships described above should yield immediate and practical information of use in planning and forecasting and should also yield insights into the development of formal models of outdoor recreation decisionmaking that incorporate substitutions. The more limited set of opportunities for outdoor winter recreation and the current dynamic nature of the winter sports market suggests that this market may be the most productive one for further study of substitutability.

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PARTICIPATION IN WINTER RECREATION ON FEDERAL LANDS

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Not much information has been collected on dispersed winter recreation activity taking place on federal lands. The first such effort which encompassed the entire spectrum of federal lands was undertaken in 1977. The Heritage Conservation and Recreation Service (then Bureau of Outdoor Recreation) sponsored a survey of recreators on federal lands during the winter, summer, and fall seasons. Respondents described their recreational use patterns and demographic characteristics, offered their opinions on management practices and site conditions, and expressed their perceptions of deterrence to participation. A companion nationwide telephone survey was conducted so that comparisons could be made between the general population and those recreating on federal lands. The surveys were in conjunction with the 1979 National Outdoor Recreation Plan. This paper focuses on the seasonal differences in the recreational use of federal lands.

In order to draw a representative sample of recreators on the federal estate, a random multi-stage probability system was employed. The first step required a scheme to choose specific management areas where the interviewing would take place, and the second step required a scheme for choosing respondents on the designated sites. Each discrete land area was stratified by federal agency, e.g., national parks for the National Park Service, national forests for the U.S. Forest Service. For analytic purposes, approximately 40 areas were selected for each of the three largest providers of public usage, i.e., National Park Service, Forest Service, and the Corps of Engineers. The number of areas chosen for the other four land managing agencies was proportional to the total recreational use reports.

Within each federal agency, land areas were then chosen at random with probabilities proportionate to official yearly visitation statistics after first being certified as to the 10 federal regions. Thus, a park with 2 million visitors annually had twice the chance of being chosen at random than a park with 1 million visitors annually. The use of systematic random sampling techniques with lists stratified by visitation and region ensured that the final sample of areas would be maximally representative of these characteristics in the population.

A total of 155 areas was chosen for the federal estate survey. All areas were visited by the survey team during the summer survey period of June, July, and August. Subsamples of 35 areas were chosen for winter and fall survey efforts. The winter survey was conducted during February and March and served as a pretest of the questionnaire and methods of sampling. The subsample was adjusted for the fall survey conducted in October and November to ensure that seasonal recreational activities were represented.

Once the list of areas was procured, an itinerary was drawn for each member of the survey team which established the order of interviewing and the number of days spent interviewing at each area. The interview time spent per area ranged from 4 to 18 days and reflected the relative annual visitation figures reported for 1975. The order of the summer itineraries was designed to ensure that all sections of the country would be visited more than once during the summer.

The second sampling unit was the recreator on the designated area. The primary objective of this sampling scheme was to collect interviews which accurately reflected the array of recreators utilizing the area. The roadside interview at exit points common to all area recreators was considered to provide the most accurate results to this end. Another primary consideration was to interview people who had been recreating in the area long enough to offer opinions about the operation and maintenance of facilities at the area.

Seasonal participation rates for various recreational activities on federal lands are displayed in Table 1. From a national perspective, recreational use of federal lands does not dramatically change with the seasons. Sightseeing, observing nature, and driving for pleasure are popular activities all year around. Regional analysis of the winter survey data

would be unreliable since only 35 acres were included in the survey and only 808 interviews were conducted. Although the dispersed winter recreation activities of hiking and backpacking, cross-country skiing, and snowmobiling were not among the most popular activities nationally, their numbers were much more significant in the northern tier of states.

Other descriptors of the on-site recreational experience are displayed in Table 2. Winter visitors were more likely than visitors during the summer or fall to limit their visits to one full day outing and to have three or more people in their party.

Perhaps the most useful information collected by the 1977 surveys is the demographic descriptors of the recreators. As shown in Table 3, winter visitors were very similar in socioeconomic terms to those visiting the federal estate during the summer and fall except for sex. A higher percentage of the recreators are men in the fall and winter than the summer. Other socioeconomic data that was collected for the survey but not displayed in Table 3 included occupation, type of residence, living environment (urban, suburban, rural) and whether or not the respondent's family owned a second home. In all cases, the response rates were very similar over the seasons.

Respondents were also asked to disclose their reasons for choosing the area visited. The most common responses from winter visitors were convenient location and good facilities. Scenic beauty and familiarity with the area were more likely to be cited in the summer and fall than during the winter season.

Recreators were asked if they were satisfied with their recreational experiences on the federal estate. Response did not vary by season. Only five to six percent of the respondents expressed dissatisfaction. Over 80 percent of the winter visitors expressing dissatisfaction were displeased with the condition or nature of recreational facilities available to them. In like token, respondents suggesting improvements to the area most frequently cited facilities-oriented projects. Thirty-seven percent of the winter recreators interviewed indicated that no improvements were necessary.

Perhaps the greatest utility of this study is that its unique scope provides for a benchmark from which future studies of recreators of the federal estate can be compared. Never before have we had a common data base for all recreational users of federal lands over three seasons. The effects that federal land use policy have on recreational activity can now begin to be monitored.

TABLE 1 SEASONAL DIFFERENCES IN PARTICIPATION ON THE FEDERAL ESTATE

(percent)

Outdoor Activity	Season of survey		
	Summer	Fall	Winter
Sightsee at historical sites or natural wonders	38	30	41
Camp in developed area	38	21	7
Other swim or sunbathe	35	3	2
Walk to observe nature, bird watch, or wildlife photography	35	34	31
Picnic	35	19	13
Fish	34	27	22
Drive for pleasure	31	34	NA
Hike or backpack	20	20	16
Other walk or jog	17	13	NA
Other boat	13	7	7
Camp in primitive area	9	12	3
Water ski	9	1	1
Other sports or games	6	3	5
Bicycle	6	3	2
Canoe, kayak or river run	4	1	1
Drive vehicles or motorcycles off-road	4	3	1
Horseback ride	2	3	1
Attend dances, concerts, plays	2	*	*
Pool swim or sunbathe	2	*	2
Visit zoos, aquariums, fairs, carnivals, amusement parks	2	1	1
Attend sports events	1	*	3
Tennis	1	*	*
Golf	1	*	*
Sail	1	*	0
Snowmobile	*	*	6
Downhill ski	*	0	18
Cross-country ski	*	0	5
Sled	*	0	5
Hunt	*	18	*
Ice skate	*	0	1

Note: Federal Estate Population

NA = not asked during winter survey

* = less than .05 percent

TABLE 2 RECREATIONAL USE PATTERNS ON THE FEDERAL ESTATE

(percent)

	Season			Agency (summer only)			
	Winter	Fall	Summer	NPS	USFS	COE	FWS
Travel Time							
0-1 hours	NA	32	31	19	24	47	47
2	NA	24	16	10	18	23	15
3-4	NA	21	14	12	19	14	11
5-8	NA	11	14	16	16	9	9
9+	NA	12	25	43	23	7	18
Length of Stay							
0-2 hours	16	16	17	26	7	13	27
2-4 hours	19	14	12	14	8	11	26
4 hours to 1 day	35	21	19	21	16	22	26
Overnight or more	25	48	51	39	69	53	20
Number of Previous Visits							
0	NA	32	45	66	40	25	42
1-2	NA	22	19	15	24	19	17
3-5	NA	15	11	7	14	15	12
6+	NA	31	25	12	22	41	29
Number of People in Party							
1	NA	7	2	2	2	2	2
2	16	36	26	29	27	22	27
3	39	17	16	17	16	14	19
4	11	14	18	18	18	17	18
5+	34	21	35	29	35	43	31

Note: Federal Estate Population

NA = Question not asked during winter survey period.

TABLE 3. SOCIOECONOMIC CHARACTERISTICS OF THE GENERAL POPULATION AND RECREATORS ON THE FEDERAL ESTATE

(percent)

	General Population	Federal Estate Population		
		Winter	Summer	Fall
Age				
12-17 (12-20)*	12	(15)	10	7
18-24 (21-29)	15	(28)	18	15
25-34 (30-44)	21	(31)	25	25
35-44 (45-64	12	(20)	19	18
45-54 (65 and over)	15	(6)	13	13
55-64	10		9	14
65 and over	14		6	8
Education (highest grade completed by those at least 18 years of age)				
Elementary	4	1	2	1
Junion/Middle	11	5	6	6
High	59	38	48	49
College	21	41	33	36
Graduate	5	14	11	8
Annual Family Income				
Under $6,000	18	11	7	7
6,000-9,999	23	13	13	13
10,000-14,999	18	18	23	23
15,000-24,999	23	29	34	37
25,000-49,999	9	18	16	15
50,000+	2	4	3	3
Sex				
Female	54	34	42	32
Male	46	66	58	68
Race				
Black	11	2	2	4
White	86	95	95	94
Other	2	2	2	2

*age categories for winter on-site survey only

THE IMPLICATIONS OF ENERGY COSTS AND AVAILABILITY TO MOTORIZED OFF-ROAD RECREATION

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Abstract.--The growth of dispersed motorized recreation and the continuing energy crisis suggest a need to examine the interrelationships of energy and recreation. The impacts of energy availability and costs on outdoor recreation are portrayed. Conversely, the role of recreation in energy conservation is examined. Implications for the resource manager are discussed, and areas needing further research are indicated.

INTRODUCTION

For the past two decades, snowmobiling and ORV use on public lands have continued to increase. Rising incomes, increasing leisure time, growing suburbanization, and increasing participation in adult sports are perpetuating this trend. With dispersed motorized recreation use continuing to rise each year, planners must be aware of the implications of energy and petroleum shortages to resource management (USDI 1978c). Unfortunately, questions concerning the effects of energy costs and availability on outdoor recreation have gone largely unanswered. Research is needed to determine how and to what degree dispersed recreation can be integrated with energy conservation. Such studies would improve methodology for resource management and planning (Shafer and Lucas 1978). The purpose of this paper is to examine the impacts of energy consumption, costs, and availability on outdoor recreation. ORV use, specifically snowmobiling, and other dispersed recreational activities are examined. While impacts to revenues and employment in the leisure and recreation industry are discussed, this paper will primarily examine the effects of the energy crisis on outdoor recreation use.

ENERGY SHORTAGES AND CONSERVATION

An analysis of the energy-short years, 1973 to 1975, will give us an historical perspective of what to expect in the years to come. Four-wheel drive and snowmobile production declined significantly during the economically-insecure years of 1973 to 1975. While a primary cause for this production decline was an accumulated snowmobile inventory, the energy supply situation complicated the problem. At the same time, the total number of ORV users on public lands continued to rise (McCool 1977).

When the gas shortage first became severe (November/December 1973), snowmobile sales were depressed. When it became apparent in early 1974 that snowmobiling and recreation in general would not be restricted and that the personal use of gasoline was an individual's choice, sales increased (Doyle 1974). From January to March 1975, as gas became more plentiful and the economic situation appeared to be stabilizing, sales again increased. Individuals adjusted to the shortages and developed alternatives and personal conservation policies. During mid-1975, the nation gradually resumed former gasoline consumption patterns in spite of higher prices.

Leisure time activity distribution, expenditures, transportation modes, and travel distances are affected by energy shortages (Booz, Allen, and Hamilton 1974). During the winter of 1973-74, a survey of snowmobile use in the three-state region encompassing Minnesota, Michigan, and Wisconsin indicated that 28 percent of the respondents spent fewer days snowmobiling due to the gas shortage. An estimated 17 percent reduction (i.e., 5,689,000 user days) in snowmobile use was the result (Gogebic Community College 1974).

Such a reduction in snowmobile use could be attributed to a shift of leisure hours to

additional home or community activity. As this shift occurs, leisure-related expenditures for activities outside the home decrease. Those segments of the industry supporting travel-related activities are likely to suffer severe revenue and employment impacts (Booz, Allen, and Hamilton 1974). During energy-short years, many recreational industries are likely to experience decreasing revenues in service or manufacturing operations. Industries related to activities needing weekend vehicle travel and substantial amounts of fuel would be most susceptible. Skiing, boating, and driving for pleasure are in this category.

Fuel shortages also affect modes used for leisure transportation and distances traveled. Shorter trips are becoming more common. Sunday gas station closings are limiting the driving range for recreational purposes. Furthermore, the uncertainty concerning Saturday hours and weekend gasoline availability is discouraging many participants from making trips. During the shortage years of 1973-74, several ski resorts installed gasoline pumps or encouraged local stations to remain open on Sundays to provide gasoline for the trip home.

Some national energy conservation proposals developed by the U.S. Department of Energy have suggested weekend service station closings and gasoline rationing. Historically, the U.S. Congress has rejected such proposals because of their implications to recreation and tourism (Doyle 1979). However, with the passage of the Emergency Energy Conservation Act in late 1979, the President now has the power to ration gasoline during a fuel-supply emergency. Such a gas rationing plan would consider historical driving patterns and therefore would attempt to minimize impacts to the tourist industry. Before implementation of such a plan, however, the implications to recreation should be carefully examined.

Reliance on mass transit and buses for recreational pursuits is becoming more commonplace. The development of special and commercial transportation services as well as the extension of urban transit to outlying recreation areas is occurring. Another trend calls for the development of more recreation facilities placed along existing public transportation routes (Oregon Department of Transportation 1978).

Income, profession, and other demographic characteristics play an important part in determining the magnitude of energy shortage impacts on the recreational activities. Skiing provides an interesting example. Because about two-thirds of skiing occurs on weekends, and the majority of skiers rely on the automobile, this sport is quite susceptible to weekend driving restrictions. A white-collar worker can cope with these driving restrictions by taking a skiing weekend and returning on Monday when gas is available. This option may not be available to the laborer. Furthermore, skiers with high incomes would be less susceptible to gasoline price increases.

While a qualitative assessment indicates that there is a high potential impact to skiing revenues as a result of energy shortages, impacts to snowmobiling revenues would be relatively minor. Booz, Allen, and Hamilton (1974) conclude that snowmobile gasoline requirements are small and that the vehicles are generally used close to home. For these reasons, the sensitivity of the snowmobile industry to energy shortages would be low.

It is interesting to note that while snowmobiles are generally used close to home, an estimated 40 percent of the 2 million snowmobiles in the U.S. are trailered. Moreover, about 80 percent of snowmobile owners can use their machines without trailering (Booz, Allen, and Hamilton 1974). In 1972, the International Snowmobile Industry Association (ISIA) estimated that about one-half of all snowmobile trailering was not necessary, and hence 23 million gallons of gasoline could have been easily saved without affecting total snowmobile usage (Doyle 1974).

Due to associated travel, virtually all recreational activities consume energy. The gasoline consumed for an entire day of local snowmobiling is often less than the gasoline required simply to drive to and from sites for other recreational activities such as skiing, bowling, or indoor tennis. The ISIA has concluded that snowmobiles use a miniscule amount of energy in a local situation and that snowmobile gasoline consumption is essential and justifiable (Doyle 1977, 1978). Such associations are promoting the importance of year-round recreation to individuals and to society and are further encouraging all energy consumers to contribute to energy conservation. The World Snowmobile Racing Federation has stated its willingness to sacrifice a percentage of fuel used in their sport in relation to the fuel sacrificed by other forms of recreation (Vint 1979). Through conscious efforts by all recreationists, energy can be conserved without giving up our chosen forms of recreation.

Sheridan (1979) states that all motorized recreationists consume about 1,040 million gallons of gasoline per year--less than 1 percent of the nation's total gasoline consumption. Even with the energy consumption to and from riding sites, the impacts of motorized recreation on energy use are still quite minimal. The impacts of air travel, in comparison, are much greater (Sheridan 1979). Thus, the energy consumption of ORV's does not appear to be a major issue unless a national energy emergency occurs. Similarly, in Canada, government intervention to control

gasoline distribution is unlikely unless a national emergency is declared (Doyle 1979).

ENERGY PRICES

In 1978, the U.S. Department of Transportation concluded that recreational travel would increase about 3 percent per year from 1975 to 1990 (U.S. Department of Transportation 1978). This projection assumes that increasing petroleum prices would have no impact on recreational travel. In reality, future increases in gasoline prices may impact recreational travel if the cost of gasoline becomes high relative to real disposable income (USDI 1978b). Such a situation may well occur, but the magnitude of impacts would be dependent on such factors as the elasticity of demand for gasoline and the availability of substitutes (e.g., more fuel efficient transportation). In 1977, the Heritage Conservation and Recreation Service found that about half of the public was taking fewer and shorter trips as a result of gasoline prices at that time. Further, about 80 percent of all the respondents said that they would limit recreational trips if gasoline were to double in price over the following 6-month period (USDI 1978a). This hypothetical doubling of gasoline price represents a greater proportion of real disposable income. At present, declining park visitation and similar trends are the result of increasing prices coupled with gas shortages and uncertainties concerning fuel availability.

In some areas, recreational driving for pleasure or sightseeing may be declining, but at least one study shows that travel associated with many activities is increasing. Bevins et al. (1979) point out that from 1976-1977 there has been little voluntary effort to reduce recreational travel. In their survey area encompassing 13 northeastern states, a net gain in travel occurred for 17 of 22 activities and was substantial for such "energy-efficient" activities as backpacking, tenting, and hiking. Further, they found that activities requiring extensive equipment (e.g., RV camping, boating, fishing, motorcycling, and snowmobiling) tended to take place farther from home. In these cases, travel costs are probably considered minor compared to equipment costs. As the energy crisis continues and new policies are formulated, however, recreationists may be forced to seek opportunities closer to home. This study is interesting in that it shows that recreationists desire different experiences, high quality opportunities, and areas and facilities close to home. Recreational travel is often not a major factor in the search for better areas and new experiences. In light of the energy crisis, land managers can cope with these demands by providing a multitude of high quality opportunities near population areas. Moreover, all recreationists should realize their responsibilities for energy conservation.

Further research is needed to clarify the effects of gasoline price increases on different recreational groups. While the 1977 National Outdoor Recreation Survey provided information showing that ORV operators are only slightly more sensitive to present and future gasoline prices than non-ORV operators, the same conclusions may not be valid at present with costs continuing to rise.

SALES TRENDS

The impacts of gasoline shortages and skyrocketing prices on the sales of recreational goods and services vary depending upon the industry. Snowmobile sales have been rising steadily in recent years. In the 1978-1979 season, for example, new snowmobile sales in the U.S. were up 24 percent. Automobile and recreational vehicle sales, however, are much more sensitive to gasoline shortages and rising prices. In 1979, the recreational vehicle industry, for example, expects to sell almost 50 percent fewer vehicles than the nearly 527,000 sold in 1978 (LaBella 1979). A primary reason for this sizeable decline in RV sales is that the recent energy crisis hit in the early spring of 1979 during the peak selling season. To cope with these problems, recreational vehicles and automobiles are being made smaller, lighter, and more fuel efficient. The snowmobile industry is also working to improve snowmobile fuel efficiency. Additionally, consumer interest in vehicle fuel consumption is encouraging some industries to take the innovative approach of labeling recreational goods with energy use information.

CONCLUSION

In summary, dispersed recreation areas are traditionally located in remote rural locations where more "natural" experiences are available. The continuing energy crisis indicates a need to provide areas and facilities closer to urban areas. At present, recreationists are desiring suitable areas for dispersed pursuits nearer their homes. As shifts to local areas occur, high quality opportunities are severely limited by capacity. A limited amount of available space results in increased competition between different groups of users (e.g., snowmobilers and cross country skiers). While additional facilities are being developed, controls and regulations may be necessary to minimize these conflicts.

As a nation, changing attitudes toward energy conservation raise the question of the feasibility of traditional recreation practices. Even though ORV and snowmobile energy consumption is not currently a major issue, most recreationists

are willing to sacrifice freedom of action to conserve energy or to protect a given environment. Further, there is growing support for less consumptive forms of recreation as conflicts continue to persist between ORV and non-ORV users (Knopp and Tyger 1973). At the same time that attitudes toward energy conservation are changing, inflation is resulting in higher operating costs and diminishing budgets. These considerations will influence the provision of future recreation opportunities.

Despite energy shortages, the growth prospects for motorized off-road recreation seem promising. Increasing conflicts between user groups will reinforce the need for additional recreational facilities closer to population areas. For these reasons and others discussed in this paper, the implications of energy costs and availability to land management and recreation planning warrant our immediate attention.

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PREDICTING TRENDS IN MICHIGAN SNOWMOBILE POPULATIONS USING PRODUCT LIFE CYCLE AND DIFFUSION OF INNOVATIONS THEORIES

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INTRODUCTION

Our inability to accurately forecast the future of outdoor recreation activities continues to be a major obstacle in recreation planning and impact assessment. Forecasts are especially important for activities undergoing substantial change and resulting in significant impacts on resources, policies, or programs. Unfortunately it is precisely these types of activities that forecasters are generally least prepared to handle.

Forecasting the future must be based upon an understanding of the forces producing change. These must be identified through empirical study of past and present behavior. Until we improve efforts to identify and measure trends, we shall have little information to guide prediction (Stynes, et al. 1979).

The recent history of snowmobiling affords an opportunity to examine in some detail the adoption and diffusion of a recreation activity. An understanding of the growth of snowmobiling will shed some light not only on snowmobiling's future, but perhaps also on the potential growth of other emerging activities.

Our purpose here is to review some basic theories of change and to illustrate their application to the study of patterns of growth in recreation activities by applying them to snowmobiling. More specifically, the product life cycle concept from marketing and theories of diffusion of innovations from the field of communication are presented as theories that might assist in capturing and predicting dynamic change processes within outdoor recreation. Cross-sectional and longitudinal research designs for studying change are illustrated and compared.

PRODUCT LIFE CYCLE

The product life cycle concept (PLC) is based upon observation of a common growth pattern in sales of a product and the recognition of distinct stages in this pattern beginning with the introduction of the product, progressing through a period of rapid growth to a maturity stage, and finally entering a decline stage. The PLC generally exhibits an S-shaped growth curve as illustrated in Figure 1 using Michigan snowmobile registrations as an indicator of growth in snowmobiling. Snowmobile sales (Szcodronski, 1978) and participation rates (Nielsen, 1979) have followed similar growth curves.

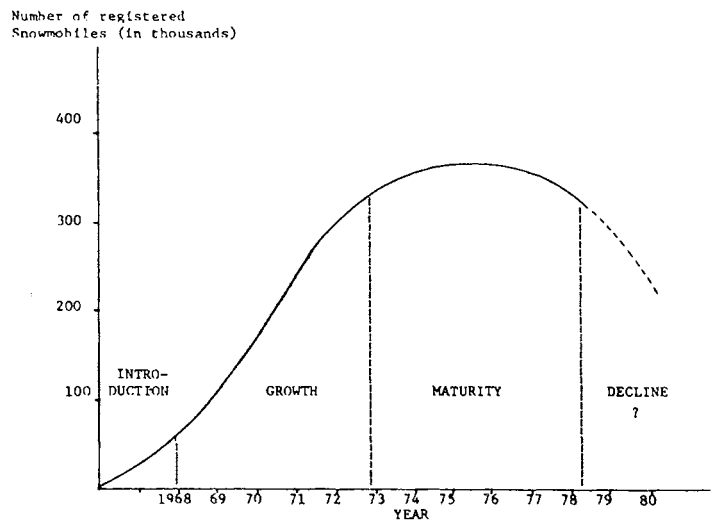

FIGURE 1. GROWTH PATTERN OF SNOWMOBILING IN MICHIGAN

The PLC concept has a variety of potential uses within recreation. Kotler (1976) focuses on the general marketing implications of each stage in the cycle, and also suggests its utility in planning, control, and forecasting.

Crompton and Hensarling (1978) discuss the managerial implications of life cycle stages for recreation agencies. LaPage (1974) first introduced the concept to recreation in describing the growth stages within the camping market.

The general theory suggests that new products are introduced by several small firms with limited capital and managerial experience. These firms are joined by many more firms during the growth period. Management skills, marketing, and industry organization also typically grow during this stage. As the industry reaches maturity, more successful firms grow in size and less successful ones drop out. Market shares are increasingly captured by the larger firms in the maturity stage. LaPage found these stages to hold for the campground industry.

The Snowmobile Industry

If we examine the snowmobile industry growth, we find a similar pattern. Although the transition from one PLC stage to another is not clearcut, we can roughly identify the snowmobile industry in its introductory stage in the early 60's, passing through the growth stage during the late 60's and early 70's, reaching maturity between 1973 and 1977, and entering a decline stage in the late 70's. The number of firms within the industry changed from a few pioneers to over 100 manufacturers by 1970, and then back to just ten firms by 1976 (Doyle, 1976).

The trends over time in marketing and organizational features of the snowmobile industry are also in accord with product life cycle theory. During the growth stage the industry became more organized and increasingly regulated with respect to noise, safety, and environmental standards. As the industry approached maturity, increasing marketing, research, and lobbying are observed (Doyle, 1973). Product diversification is also witnessed in the great variety of machines on the market during the intense competition of the growth period.

In short, with the advantages of hindsight and PLC theory, the history of the snowmobile industry seems highly predictable. The ability of the PLC concept to describe past behavior is interesting, but Kotler (1976) states the concept is of limited use in forecasting because different products exhibit numerous variations of the S-shaped growth curve, reaching different peak sales levels, and taking quite different periods of time to complete each PLC stage.

The role of the product life cycle in predicting growth patterns of recreation products/activities is our focus here. We argue the concept is potentially quite useful in forecasting. Knowing the typical cycle to expect is of potential use in decision making even in the absence of precise predictions of saturation levels or timing of each PLC stage.

In combination with other growth and diffusion theories and by examination of individual product attributes, forecasts can be improved using the PLC concept. Like any forecast, we must be prepared to adjust predictions based upon research and continued monitoring of supply and demand characteristics and changing environmental influences.

So far we have used the PLC concept primarily to describe supply characteristics. There is a parallel theory on the demand side where we encounter the general theory of the adoption and diffusion of innovations.

DIFFUSION OF INNOVATIONS

The snowmobile may be viewed as an innovation which was introduced and subsequently diffused throughout our society because it was communicated to potential adopters, filled a need, and was accepted by certain segments. Based upon patterns of adoption and diffusion in over 1,200 empirical studies dealing with a variety of distinct types of innovations across a number of different cultures, Rogers (1971) has advanced a general theory. We shall demonstrate the applicability of this general theory to recreation products and activities by formally and informally testing selected hypotheses for snowmobiling in Michigan.

Rogers identifies eight categories of diffusion research. For snowmobiling we shall only explore two. First, we briefly examine the attributes of the snowmobile as a guide to predicting its adoption and diffusion patterns. Then we test more specific hypotheses with respect to the characteristics of snowmobile adopters over time.

Product Attributes

Which innovations will be accepted, how fast will they be adopted, and how many people will ultimately be affected? Partial answers to these questions are suggested by an analysis of the attributes of the innovation in question.

Rogers identifies five features of innovations that influence their rate of adoption: (1) the comparative advantage the innovation has over products which it supercedes, (2) its compatibility with existing needs and values, (3) the complexity of the innovation, (4) the degree to which the innovation may be experimented with on a limited basis, and (5) the observability of the innovation. Christy (1971) and West (1979) have suggested somewhat similar factors for predicting which recreation activities will reach mass markets. Strong participant identification

with the activity, a favorable image, ease of participation, and the opportunity to demonstrate skills are factors which enhance the likelihood of a recreation activity or product catching on.

Snowmobiling's Attributes

Drawing once again on the advantage of hindsight we find the attributes of snowmobiling tell us a great deal about its pattern of growth. The snowmobile clearly has a distinct advantage over any previous means of mobile recreation in the winter. When introduced, the activity was compatible with the need for an outdoor winter activity in rural areas. Mechanical complexity and conflict with environmental values have created barriers to the adoption of snowmobiling by higher status groups, and the price of the machines has excluded the lowest income groups. In combination, these attributes explain the dominance of medium income, blue collar families among snowmobilers.

Experimentation has generally been limited to those with access to machines through friends or relatives. The observability of the sport, its strong identification through clothing, equipment and clubs, and the fact that it serves a variety of needs including the opportunity to demonstrate skills supports the rapid growth of the sport within selected social strata.

The attributes of snowmobiling provide several clues to predicting the extent of the potential markets and the expected rate of growth within these markets. Similar analyses could assist in predicting the growth of other new outdoor recreation activities, for example, cross-country skiing.

Characteristics of Adopters

Analysis of product attributes offers some insight into the characteristics of eventual adopters of an innovation. Diffusion theory also helps to predict the characteristics of adopters during each stage of its growth. We once again encounter the product life cycle concept. Industry and marketing characteristics during each life cycle stage, in part determine the characteristics of consumers for that period.

Parallel to the stages of the product life cycle, Rogers (1976, p. 184) divides adopters of a product into five subgroups: innovators, early adopters, early majority, late majority, and laggards. These are defined based upon the stage of growth in which the product was adopted and are illustrated in Figure 2 for snowmobiling in Michigan. Note the close correspondence between the ideal normal distribution predicted by Rogers and the distribution of snowmobilers measured by Szcodronski (1978).

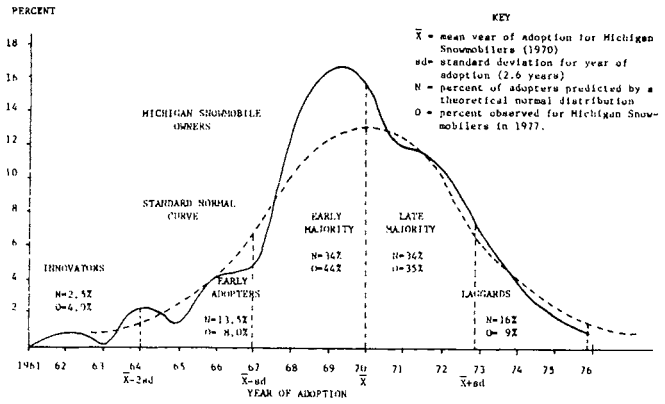

FIGURE 2. COMPARISON OF MICHIGAN SNOWMOBILERS WITH THE THEORETICAL ADOPTION CURVE

Diffusion theory predicts not only the distribution of adopters over the stages of the product life cycle, but also their characteristics. Generalizations state, for example, that earlier adopters will be more educated more socially active, and from higher status groups than later adopters. This theory is consistent with the industry and marketing characteristics predicted by product life cycle theory. Limited marketing and visibility during the introduction stage explain why early adopters tend to be more aware, more highly educated, and more prone to experiment. Increases in marketing efforts and product diversification, along with intensive price and product competition during the growth stage attract a larger and broader market; i.e. the early and late majorities. As the product reaches maturity, marketing emphasis shifts from attracting new adopters to servicing existing markets. At this point laggards enter the market and earlier adopters may have already shifted to other products and innovations, resulting in declining sales.

SNOWMOBILING IN MICHIGAN

A recent research study in Michigan (Szcodronski, 1978) provides the basis for a more rigorous test of diffusion hypotheses for snowmobiling. The snowmobile industry, the machines themselves, and the supply of facilities has changed substantially over the past decade. The question we address next is whether the snowmobiler himself has changed over this

period.

Although a review of snowmobile studies (e.g. Leatherberry 1976, Keith 1978, Chubb 1971, Holecek 1973, Bury et al. 1975) reveals a good general picture of the snowmobiler, it yields no firm conclusions about trends in snowmobiler characteristics over time. Comparing different studies to reveal trends is difficult, if not impossible, since the studies involve distinct regions, populations, survey instruments, methods, definitions of terms, and categories for socio-economic variables (Stynes et al. 1979). In order to provide a controlled test of whether or not snowmobile populations have changed over time, a survey of registered snowmobilers was conducted in Michigan in July of 1977 (Szcodronski, 1978).

This survey was designed to permit both cross-sectional and longitudinal approaches to trend analysis. A longitudinal design was achieved by replicating the questions and methods from a 1970 survey of registered snowmobile owners in Michigan (Lanier, 1973, 1974). Data from the 1970 and 1977 surveys were compared to test for trends in snowmobiler characteristics over this period. In addition, cross-sectional techniques were used in the 1977 survey to approximate a longitudinal design. Respondents were asked to recall the year they first began snowmobiling and this variable was used to segment snowmobilers into adoption groups. The advantages and limitations of each design are briefly discussed below.

Results - Longitudinal Design

Results of 1970 and 1977 surveys of Michigan snowmobilers are summarized in Table 1. The most significant difference in the two populations is the frequency of participation. Snowmobilers in 1977 averaged about half as many days of snowmobiling as their counterparts in 1970. (Lindsay (1976) reports similar decreases in snowmobile activity in Vermont between 1970 and 1975.) In addition, the number of machines per family and average horsepower of snowmobiles have each increased about 30% over the seven year period.

TABLE 1. COMPARISON OF 1970 AND 1977 MICHIGAN SNOWMOBILE POPULATIONS

Variable	Snowmobile Population Mean 1970	1977	T-value	2-Tailed Probability
Age of snowmobile owner	42.5	41.7	1.38	.16
Years of Education	12.1	12.5	3.05	.004
Days snowmobiled	48.0	23.7	13.08	.001
Snowmobiles owned	1.4	2.0	18.75	.001
Average horsepower	20.3	28.2	20.5	.001

Differences in the socio-economic characteristics of 1977 and 1970 Michigan snowmobile populations are relatively insignificant. There is an indication of some diffusion of snowmobiling to more highly educated groups, but little difference in age. The measurement of income in broad categories and problems of adjusting for inflation made income comparisons difficult. An inflation factor of 6% per year yielded comparable income distributions for the 1970 and 1977 snowmobile populations. In 1977 dollars, the median income of both populations was about $20,000.

Results - Cross-Sectional Design

Using data from the 1977 survey, trends in snowmobiler characteristics were studied by dividing snowmobilers into adoption groups. To obtain sufficient numbers of respondents within each group for statistical testing, three adopter groups were defined as follows:

	Year adopted	N	%
1. Early adopters	before 1969	99	24
2. Middle adopters	1969-1971	189	46
3. Late adopters	1972-1977	125	30
		413	100

These groups are defined using slightly different cut-off points than the distribution illustrated in Figure 2.

As an indicator of trends and a test of selected diffusion hypotheses, the three groups were compared with respect to current socio-economic characteristics, snowmobile participation patterns, and equipment ownership. Analyses of variance revealed no important differences in any of these categories between the three adopter groups. (Table 2)

In only two cases was the null hypothesis (no difference in the means) rejected at a 95% confidence level; early adopters were found to be somewhat older and to possess somewhat older machines than more recent adopters. These findings are not surprising since those adopting prior to 1969 and still snowmobiling in 1977 would have aged at least eight years in the interim as would any snowmobiles purchased at

the time of adoption.

TABLE 2. ANALYSIS OF VARIANCE IN 1977 MICHIGAN SNOWMOBILER ADOPTION GROUPS

Variable	ADOPTION GROUPS Early N=88	Middle N=170	Late N=110	F Ratio	F Prob.
	----------Mean----------				
A. Socioeconomic					
Present age	43.3	42.2	39.7	2.85	.05
Age at Adoption	34.0	36.1	36.7	1.54	.22
Education (years)	12.4	12.4	12.6	.33	.72
B. Snowmobile participation					
Days Snowmobiled (76-77 season)	25.2	23.0	23.8	.37	.69
C. Equipment ownership (per snowmobile family)					
Number of snowmobiles	2.1	2.0	1.9	1.49	.27
Age of snowmobiles	5.1	4.5	4.3	4.04	.02
Horsepower	27.2	28.3	28.9	.65	.52

When means for the snowmobiler's age at the time of adoption are compared no statistically significant difference is found. Tests of educational levels of snowmobiler adoption groups yield similar results; the means fall in the expected direction, but differences are small and not significant statistically.

Other analyses found that early adopters bought a larger percentage of their snowmobiles new and paid a higher average price for their machines than more recent adopters. These results reflect changing availability of used machines over time and perhaps a tendency for snowmobile veterans to move up to more expensive machines.

Advantages and Limitations of the Two Designs

Both the longitudinal and cross-sectional analyses reveal little change over time in Michigan snowmobiler population characteristics. These two designs test somewhat different hypotheses on different populations. The longitudinal design compares snowmobile populations in the two years 1970 and 1977, while the cross-sectional design examines only 1977 snowmobilers, comparing the current characteristics of subgroups defined by length of involvement in the activity.

Table 3 helps to sort out differences in the two populations by identifying three groups of snowmobilers: (I) individuals with registered snowmobiles in both 1970 and 1977, (II) 1970 registered snowmobilers who dropped out by 1977, and (III) 1977 snowmobilers who registered machines after 1970.

The Lanier 1970 survey sampled snowmobilers from the first two groups, while Szcodronski sampled from groups I and III in 1977. The cross-sectional analysis using the 1977 survey data excludes snowmobilers dropping out of the activity by 1977. In using this data to characterize snowmobile populations in previous years, a bias will be introduced. The extent of the bias will depend upon the numbers of dropouts and the degree to which dropouts differ from recent adopters and from those continuing in the sport. Deaths and migration will introduce errors of a similar nature.

TABLE 3

	1970 Snowmobiler?	1977 Snowmobiler?
Group I	yes	yes
Group II	yes	no
Group III	no	yes

Another problem with using cross-sectional surveys to explore trends is that by definition cross-sectional surveys measure characteristics of the population at only a single point in time. Snowmobiler characteristics measured by Szcodronski describe snowmobilers in 1977, not when they adopted the activity. We can assume that educational levels for adults will not change significantly over time and age can be adjusted back to the year of adoption. Income, lifestyle, and other socio-economic variables of potential interest are more difficult to project backwards in time and will probably be subject to more serious recall errors if respondents are asked to provide such information for prior years.

Longitudinal designs avoid recall errors and other problems of cross-sectional designs, but are often impractical based upon time and cost considerations. Research funding is generally for restricted periods of time and variability in researchers time and interests make commitment to five or ten year studies difficult. Replicating previous research is a reasonable compromise. However, successful replication of previous research is highly dependent upon good documentation of both methods and results.

In summary, both longitudinal and cross sectional designs may be employed to study change over time. In both instances care must

be exercised to ensure that the relevant populations are sampled, sources of error are recognized and controlled for, and appropriate conclusions are drawn.

CONCLUSIONS

While a great deal more research is needed to more fully incorporate dynamic growth processes within outdoor recreation decision and planning models, the ability of product life cycle and diffusion theories to explain patterns of growth in snowmobiling suggests their potential value.

Future research should focus on adapting these and other existing models of change to outdoor recreation, developing general theories, and conducting empirical tests on particular activities. Improvements in time series data will be needed since such data must be the foundation for empirical study of change.

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SNOWMOBILING AND CROSS-COUNTRY SKIING CONFLICTS IN UTAH: SOME INITIAL RESEARCH RESULTS

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INTRODUCTION

One of the major problems facing recreation resource managers in many kinds of recreation sites is the allocation of available facilities, whether natural or man-made, among competing users. The assumed goal of the allocation of public resources is maximizing the welfare of participants as a whole. Two somewhat related conceptual approaches to allocation decisions appear to be rather widely accepted among recreation managers and researchers: "carrying capacity" and the "opportunity spectrum". From an economist's viewpoint, the former approach may lead away from a social optimum; the latter amounts to a short-term technological "fix" which is convenient for managers but does not deal with the more critical problems involved in congested resources. Both have little empirical base with respect to benefits and costs. Some current economic research, both conceptual and empirical, demonstrates these shortcomings and suggests an alternative framework from which to make allocation decisions.

THE "STATE OF THE ARTS"

While there is little need for an in-depth review of either carrying capaicty or opportunity spectrum as management tools, a brief statement of the salient features, and some exposure of the implicit characteristics, of each is useful.

Carrying Capacity

Carrying capacity models suggest that for a given set of attributes which a specific site possesses, there is some point at which higher use rates will cause degredation of the site physically or a diminution of recreators' perception of site quality and/or enjoyment of the experience. There are three basic classes of variables which determine this carrying capacity: 1) biological or physical characteristics; 2) user perceptions and desires, and 3) the management objectives associated with the site. Many early writers on this subject (Lime, 1970; Stankey, 1971) focused upon the first two aspects of carrying capacity. Stankey (1972) and Stankey and Lime (1975) later noted that the third group of variables plays an important role in determining which criteria and/or users are significant. For example, if an area is designated by management for use by alpine skiers, the perception of cross-country skiers using the area is likely not to be the limiting factor, nor would be the achievement of climax vegetation on the designated area. The carrying capacity may be contracted or expanded from management decisions alone. However, within a management context, the degredation of either physical or psychological attributes suggest that carrying capacity has been reached.

Economic theory suggests two related problems with the sociological carrying capacity concept: First, the specification of a carrying capacity is dependent upon the onset of congestion, that is, the initial observation of costs imposed at large. Second, only under a limited set of circumstances will the social optimum occur at the onset of congestion. These circumstances involve cases wherein the additional social cost exceeds the incremental user's net willingness to pay for the experience. If physical deterioration is treated similarly, and there appears to be few reasons why it cannot, economic theory suggests that the social optimum may, and likely will, occur where some deterioration of the physical and perceived circumstances is allowed. Furthermore, the social cost of a conservative policy may be large. The question is an empirical, not a conceptual, one. A further treatment of the theory of congestion and an empirical approach will be discussed later in the paper. There has been some recognition among social scientists that the carrying capacity approach is a relatively empty management concept (Schreyer, 1979).

The Opportunity Spectrum

The "opportunity spectrum" approach, as suggested by Driver and Brown, (1978) and Brown, et. al., (1979), appears to be a means of avoiding congestion by assessing the physical or sociological characteristics of a site with respect to

suitability for various recreation activities, determining the most appropriate management objectives for a site or areas within a site, and managing each site or area primarily (if not exclusively) for the "best suited" activity or activities. Given the methodology, carrying capacity is the implicit, if not explicit (Brown, et. al., 1979), criterion for allocating an area among uses. Congestion costs among different kinds of users is reduced or eliminated. This management practice essentially ignores the loss of utility to users who are excluded from an area by assuming that any competition between other user groups and the chosen user group is not optimal, and that inter-user group congestion should be eliminated. Little or no treatment of intra-user group competition is made. The opportunity spectrum approach, while relatively easy and practical from a management perspective, could achieve a social optimum only under fortuitous circumstances. An economic welfare criteria would suggest that the opportunity spectrum is efficient if and only if the costs imposed on users from exclusion from specified areas is less than, or equal to, the cost of congestion with the unregulated case. In fact, given the relatively extensive area requirements for wilderness use, it is likely that for many public land allocation problems, a relatively low marginal cost of congestion to wilderness users involves large congestion costs to other users, which increases as the demands of other users increase. Thus, the opportunity spectrum approach, while relatively low cost administratively, may allocate resources inefficiently.

A second economic issue arises with the opportunity spectrum approach, in that if user groups differ significantly in socioeconomic characteristics, allocation of land to specific user groups may redistribute real income in a nonrandom direction. Carrying-capacity-based management on a first-come, first-serve basis, may also redistribute income, but such a redistribution will likely not be a necessary and consistant effect. The economic treatment of competition among users should provide some better information on which managers can base allocation decisions.

THE ECONOMIC EFFICIENCY OF CONGESTION AND OPTIMAL USE

On-site competition consists mainly of interactions between users of the services and facilities of a given site. When users compete for a "free good" such as a publicly provided recreation site, the possibility is high that, given a sufficiently large population of users who can use the site, "over-use" of the site will occur. Over-use is herein defined as use greater than is economically optimal or efficient. The reason for the deviation from the economic optimum is the congestion of the facility due to the fact that the marginal user equates something less than the cost he imposes to the benefits which he derives. The conceptual framework for congestion can be found in Haveman's congestion model (1973). The TWP or f(x) curve is the total willingness to pay on the part of users and is a function of the utility derived from use of the site. The user costs (g(x)) are the costs of visitation multiplied by the number of users.

The linear TC curve suggests a constant per visit cost (that is, constant long-run time and travel costs, according to Haveman). At some use rate, say X_A, congestion occurs and costs associated with extra use (CG or h(x)) are added to the cost curve in TC'. The economic optimum use occurs where the slope of the two curves (TWP and TC') are equal (at X*). At that level of use, a'b' is the addition to total cost from congestion. Since this cost is born equally by all the recreators, total willingness to pay is reduced by a'b'. In fact, each recreator will equate the slope his reduced TWP (his TWP less the distance between TC' and TC divided by the total number of users) to the slope of TC. This can be shown mathematically.[1,2] For the social optimum

$$= f'(x) = g'(x) + h'(x)$$

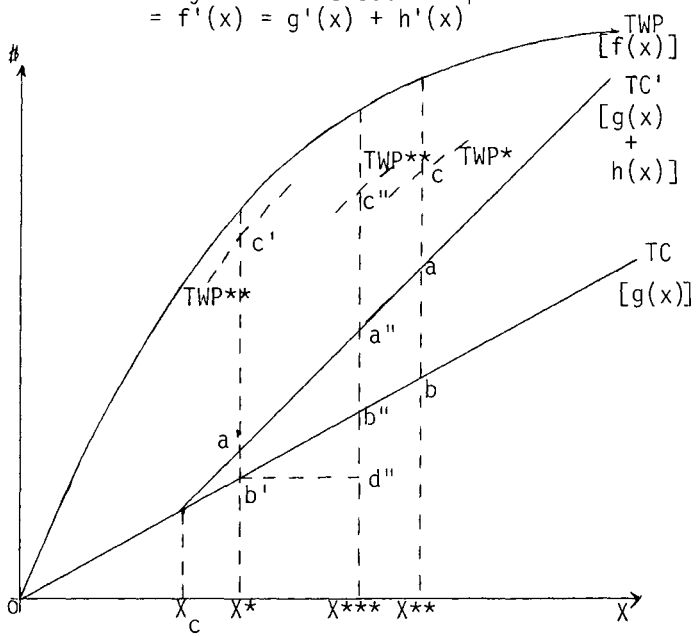

Figure 1. The Graphics of Congestion Costs

For the use of the congested site each recreator actually equates

$$\frac{\partial(f(x) - \frac{h(x)}{x})}{\partial x} = \frac{\partial g(x)}{\partial x}$$

[1]Note that f'(x) is equivalent to the demand curve.

[2]Note that the optimal condition is satisfied no matter which curve, cost or willingness to pay, is marginally adjusted for congestion.

or

$$f'(x) = g'(x) + \frac{\partial\left(\frac{h(x)}{x}\right)}{\partial x}$$

and for $x > 1$, $\frac{\partial\left(\frac{h(x)}{x}\right)}{\partial x} < h'(x)$

This implies that the slope of TWP for each user is less than if he considered his total marginal cost; and, therefore, number of trips taken will be larger and more congestion will occur than is socially optimal (at X**).

Anderson and Bangor (1974) suggest that the values of recreation calculated from observed demand curves overestimate the surpluses as a result of congestion. Areas under the individual demand curves are significantly different from the economically optimal demand curve. Their argument is based on the facts that until congestion is reached, the individual demand curve is continuous (TWP curve is continuous as well). At the onset of congestion, however, each user's demand curve shifts leftward (by CG/X_A) or down (as does the TWP by CG). Both Haveman's and Anderson and Bangor's model imply that the individual's demand curve will be discontinuous at X_A.

Use of the Haveman model does allow a more precise definition of the sociological capacity which Stankey, Lime, and others have utilized: the onset of congestion (Point X_A) in Figure 1. It is also directly related to the elimination of congestion through the opportunity spectrum approach. Establishing capacities for policy purposes based on the onset of congestion could fall short of a social optimum, in which some congestion occurs. Further, the sociological literature does not suggest analytical techniques, other than survey, with which to establish the onset of congestion.

In any event, the definition of carrying capacity as the onset of congestion is not the only possible definition. Several approaches to definitions of carrying capacity have been discussed by Bishop, et. al. (1974). The conclusion of this research was essentially that carrying capacity, while a theoretical tool or concept of considerable merit, is not a viable empirical or practical tool for management of resources in which social or social-psychological factors are critical (such as recreation). Schreyer (1979) draws a similar conclusion.

Physical systems do lend themselves to capacity measures of some kinds, however. For example, transport systems have a certain number (or range) of vehicles beyond which the system collapses (in that only zero or constant reduced velocity of transport is possible). The equivalent in recreation would be some number of participants beyond which no added participation would occur, regardless of population pressure, income, tastes and preferences, or other demand shifters. Such a capacity can be incorporated into the Haveman model by using a vertical TC' curve beyond some use rate. The implication is that an additional user would add an infinite amount to total cost and to average costs at X_B. Therefore, $TWP - CG < 0$ for all $X > X_B$.

Given biological or other physical constraints which are either limiting by themselves (such as traffic lane width or campground numbers), or which are established by managing agencies (such as wilderness visitors per unit time), the use rates approach or are a constant.

While the graphics and relatively simple mathematics are easily understood, a structural model and hypothesis must be generated in order to make empirical tests of social optima. This can be done using the household production function approach suggested by Becker (1971).[3]

THE STRUCTURAL MODEL

Becker assumes that goods and services purchased by the consumer and time are inputs used in producing consumer commodities which constitute the arguments in the utility function.

Becker and others have applied this approach to nonmarket activities in order to empirically estimate the economic responsed of consumers (Becker and Lewis, 1973). In particular, Cicchetti and Smith (1973) applied the approach to congestion problems in wilderness recreation.

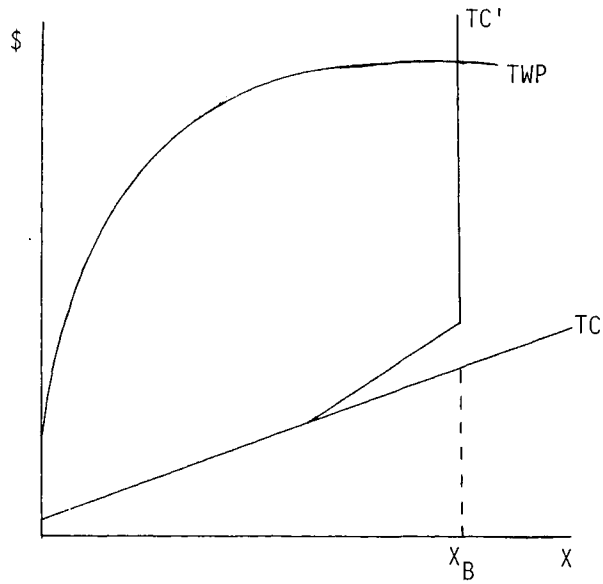

Figure 2. Maximum Congestion Levels.

The recreationist's utility function could be defined as follows:

$$U = U(R, C, Z);$$

[3]Much of the following discussion is drawn from Pajooyan (1978).

$$\frac{\partial U}{\partial R} > 0, \quad \frac{\partial U}{\partial C} > 0, \quad \frac{\partial U}{\partial Z} > 0$$

where:

R = recreation services
C = congestion reduction activity (extended travel, for example).
Z = all other commodities

The recreator faced with congestion at a site combines goods, services, and time as inputs to produce C, a commodity which decreases the effect of congestion on utility. For instance, when an individual who enjoys fishing is faced with congestion at a fishing area, he may, as a means of reducing such congestion, travel to a more remote place. Thus, inputs like time, gasoline, and car or boat services are combined to produce C. The production functions for R, C, and Z are:

$$R = r(X_R, T_R)$$

$$C = c(X_C, T_C)$$

$$Z = z(X_Z, T_Z)$$

where X_i are the input commodities associated with the recreation activity and T_i are the time inputs.

In order to define the arguments in the demand function for the recreation commodity, R, the indivdual's utility function must be maximized subject to the budget constraint. In defining the budget constraint equation, difficulties arise since commodity prices appearing in the budget constraint are not observable in the market. To analyze this problem, it is useful to divide the utility maximization problem into a two-stage procedure.

First, the cost function for recreating is minimized subject to the household's production technology for consumer commodities (Z_i's) using the duality relationships, in order to obtain the "marginal cost" of each commodity. Second, the individual's utility function is maximized subject to the budget constraint, which includes the marginal costs from the first stage.

Stage One

The commodities cost function is defined as being equal to:

$$\text{Min.} \quad \sum_{i=1}^{3} P_{X_i} X_i + W \sum_{i=1}^{3} T_i$$

Subject to the technological constraint

$$V(X, T) - V = 0$$

where:

P_{X_i} = market price of X_i goods $\quad i = R, C, Z$
W = wage rate[4]
V = vector of commodities = [R, C, Z]
X = vector of goods input = $[X_R X_C X_Z]$
T = vector of time input = $[T_R T_C T_Z]$

With the appropriate first order conditions and substitutions, and assuming no joint production, the cost function can be written as:

$$\hat{C}(P_X, W, X) = \hat{C}^r(P_{X_R}, W, R) + \hat{C}^c(P_{X_C}, W, C) + \hat{C}^z(P_{X_Z}, W, Z)$$

where

$\hat{C}^r(P_{X_R}, W, R)$; $\hat{C}^c(P_{X_C}, W, C)$ and $\hat{C}^z(P_{X_Z}, W, Z)$

are cost of producing R, C, and Z, respectively. Implicit, or shadow, commodity prices (π_i) are defined as partial derivatives of the cost function. Note that these cost functions include variables which may be empirically quantified.

Assuming no joint production and assuming constant return to scale for the household production function, the implicit commodity prices are independent of the bundle of commodities consumed (Pollak and Wachter, 1975). The budget constraint can then be defined as:

$$\pi_R R + \pi_C C + \pi_Z Z = \bar{Y}$$

where π_i is the shadow price of the i-th commodity and $\bar{Y}$ is full income.[5]

Stage Two

The second stage in the development of the structural model is the maximization of the individual's utility subject to the derived budget constraint:

$$\text{Max.} \quad U = U(R, C, Z)$$
$$\text{S.T.} \quad \pi_R R + \pi_C C + \pi_Z Z = \bar{Y}$$

One implication of the above utility maximization problem is that the demand function for recreation may be written as:

$$D_R = d(\pi_R, \pi_C, \pi_Z, \bar{Y})$$

The implicit price of other commodities (π_Z) is assumed constant; therefore, the reduced demand function is:

$$D_R = d(\pi_R, \pi_C, \bar{Y})$$

π_R and π_C are implicit commodity prices, or the marginal costs, of R and C. The marginal cost functions for R and C are derived from their respective production functions.

Assuming Cobb-Douglas production functions, the the marginal cost of R and C (MC_R, MC_C) can be derived from the duals:

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[4] See for example, Keith and Workman (1975) and Cesario (1976) for a discussion of wages as the time costs in recreation.

[5] Full income ($\bar{Y}$) is defined as:

$$\bar{Y} = Y + T_L \cdot W$$

where:

Y = disposable income
T_L = leisure time

$$\pi_R = MC_R = \frac{\partial TC_R}{\partial R} = KW^{\beta} \prod_{i=1}^{k} P_{iR}^{\alpha i}$$

$$\pi_C = MC_C = \frac{\partial TC_C}{\partial C} = LW^{\delta} \prod_{i=1}^{j} P_{iC}^{\gamma i}$$

Substituting in the demand function:

$$D_R = d(KW^{\beta} \prod_{i=1}^{k} P_{iR}^{\alpha i}, LW^{\partial} \prod_{i=1}^{j} P_{iC}^{\gamma i}, \bar{Y})$$

The implicit price of commodity C, the commodity consumed in decreasing congestion, depends on the prices of goods and time inputs, the output elasticities of the inputs, and the inverse of the technical coefficient of the production function for C. All the factors involved in the implicit prices of C and R commodities appear in the demand function for R. The changes in the prices of goods input, wage, output elasticities, and technological coefficients are the factors which will change the quantity demanded or shift the demand function.

With the appropriate data, results from demand estimation for specific sites and users using a modified Clawson-Hotelling approach[6] can be used to evaluate the economic efficiency of partitioning recreation areas, changing use fees to limit congestion, or other policies.

ECONOMIC EQUITY

The equity question is even more difficult to analyze, but general directions of reallocation may be suggested. An analysis of user socioeconomic characteristics should reveal any significant differences in income, occupation, family cycle, and other similar variables among differing user groups frequenting a specific recreation site. Exclusionary management practices will likely impose additional costs on some, or all, of these groups in a non-random fashion. Given that predictions can be made about user group reaction to the imposed restrictions, an estimation of the relative changes in real income among groups can be accomplished using the demand methodology and willingness-to-pay measures. Hence, at least the direction of redistribution of real income can be suggested. Economists, however, are reluctant, to suggest that specific redistribution are desirable or undesirable.

SOME PRELIMINARY EMPIRICAL RESULTS

Some preliminary, but relatively interesting, results were obtained for cross-country skiing in Utah in 1977-78 using the household production function approach. In addition, comparisons between the cross-country skiing data and that collected for snowmobilers during 1975-76 also provide some bases for suggesting potential distributional impacts of exclusionary policies.

Empirical Analyses of Cross Country Skiing

A list of Cache County cross country skiers was complied from names obtained from local newspaper advertising and from local instructors and clubs. From this list, 50 skiers and 50 alternates were randomly selected as the study sample.[7] Two types of questionnaires were distributed to each of the 50 selected individuals or their alternates. One questionnaire was made up of questions to be answered for each ski trip and included cost and other data for that trip. The second questionnaire included socio-economic and preference data assumed constant for the entire season.

Twenty-eight of the 50 individuals selected returned the forms. Four of the collected set of questionnaires were not useable. A total of 200 trip questionnaires were completed by 24 individuals in the sample. Only 8 persons among the 24 experienced congestion on a total of 13 trips.

The production function for R and C were defined as:

$$R = AG_R^{\alpha 1} X_R^{\alpha 2} T_R^{\beta}$$

$$C = BG_C^{\gamma} T_C^{\delta}$$

where:

G_R and G_C are gasoline used in participating (R) and avoiding cogestion (C).

T_R and T_C are time used in participating and avoiding congestion.

X_R is the index of goods used in production of R.

Two alternative statistical procedures were followed in estimating the demand function for recreation, $LnD_R = LnA + \alpha_1 Ln\ \pi_R + \alpha_2 Ln\ \pi_C + Ln\ \bar{Y}$. First, the production functions were estimated for R and C.[8] Using those results, the marginal costs were determined from travel costs and forgone wages. The recreation demand function was then estimated using the marginal costs (implicit prices) of C and R, and income levels.[9] The following statistical results were obtained:

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[6] For a review of this approach, see Gum and Martin (1975).

[7] Since the sample was not drawn randomly from a universe, there was no way to determine the representativeness of the sample.

[8] Significance levels and r^2 for these two estimations were .05 for all variables and greater than 75% respectively.

[9] Of course, this is an aggregate demand function for all observations, and as such, implies all the assumptions associated with using aggregate demands.

$$D_R = 0.06\ \pi_R^{-0.11}\ \pi_C^{-2.48*}\ \bar{Y}^{0.75*}$$

*indicates significant at the 10% level.

The r^2 was 22% which is, while low, not uncommon in cross-sectional analysis. This statistical procedure does, however, exhibit an autocorrelation bias, since the variables in the demand function are themselves stochastic and could be expected to be related to the disturbance term. Thus, a second procedure was use to obtain consistant estimators for the demand function. By (1) substituting the equation for the marginal costs of R and C into the demand function, and (2) utilizing a generalized least squares estimation of the parameters of the production functions for R and C coupled with the altered demand function, it was possible to obtain a set of equations of the parameters which could be simultaneously solved for the elasticties of recreation demand with respect to π_R, π_C, and $\bar{Y}$. These estimates are consistant and asymptotically unbiased. The demand equation was:

$$D_R = 1.42\ \pi_R^{-1.38}\ \pi_C^{-1.74}\ \bar{Y}^{1.27}$$

Given the indirect nature of the second approach, significance levels are unavailable, and the correctness of the estimation of the parameters is dependent upon the sample size. However, the results with respect to sign of the parameters (negative for prices and positive for income) and the consistency of the congestion and income parameters (within one standard deviation for the congestion and income variables) suggest that the demand for cross-country skiing is relatively elastic with respect to both the cost of avoiding congestion and full income. One implication of this elasticity is that small decreases or increases in the cost of avoiding congestion will have significant impacts on demand for specific sites, so that willingness to pay is relatively small over the range of observations. Consequently, the loss in value to cross-country skiers (that is, the willingness to pay or consumer surplus) due to congestion of a site is relatively small. One possible reason for this result is the relatively large array of easily-available (low additional cost) substitute sites. In terms of an exclusionary policy which might result from the opportunity spectrum or carrying capacity approaches, it appears that if the parameters are representative, classifying areas in Cache County for cross-country skiing only as a remedy for congestion creates little, if any, gain in economic welfare to skiers. The loss in economic welfare to snowmobilers should be estimated before such policy is instituted to ensure economic efficiency.

Socioeconomic Characteristics and Equity

A cursory analysis of the socioeconomic data as shown in Table 1 allows a comparison between the 1975-76 snowmobiling sample, the 1977-78 cross-country skiing sample and 1976 data for the general population of Utah.

TABLE 1. Socioeconomic Characteristics of Snowmobilers, and Cross-Country Skiers, and General Utah Population.

	Avg. Age Head of House Hold	Avg. Annual Income House Hold	Avg. (# of children at home)	Avg. Education (years)	Employment Type (15 or more %)
Utah*	42	10,000	1.5	13	Crafts 21% Profess 20% Clerical 16%
Snow-mobilers*	43	19,500	2.8	14	Profess 38% Crafts 18% Managerial 18%
Cross-Country Skiers**	29	18,000 (12,000)	less than 1.0	16.5	Student 50% Teacher 40%

*from Keith, et. al. (1978)

**Sample may not be representative of the population of cross-country skiers in Cache County.

The sample of cross-country skiers was comprised of approximately 50 per cent Utah State University undergraduate and graduate students. Estimates of expected income of students vary widely, but a median of $18,000 per year was used in compiling income data for the sample, based on income data from the 1976 Statistical Abstract of the U.S. Bureau of Census. The income in parenthesis was calculated using actual income for students. In both groups, income and years of education exceeded the Utah average significantly. In addition, family size was significantly smaller than the Utah average for cross-country skiers and larger for snowmobilers. Clearly, students and university teachers dominated the cross-country skiing sample. This dominance again suggests caution with respect to the representativeness of the sample, although it may in fact be accurate. Professional, managerial, and crafts occupations were significantly more evident in the snowmobiling sample, than in the general population of Utah.

While the data for cross-country skiers is suspect at best, it does appear that exclusion of snowmobilers on the sites studied would tend to result in relatively small gains in real income (welfare) to younger, more educated individuals (cross-country skiers) who receive lower current but approximately equal future income levels, and

who have no or small families. There would be an unknown cost to an older, less educated group of snowmobilers with relatively large families. Both groups, however, have significantly larger incomes and higher education than the resident Utah populations.

SUMMARY AND CONCLUSIONS

While the preliminary results are tentative, they do indicate that there are potentially large economic efficiency and equity problems associated with exclusionary management practices, such as carrying capacity and opportunity spectrum approaches involved, on sites where limtited congestion is observed. It appears to an economist to be much more reasonable to estimate both the benefits and costs to the competing user groups before such practices are employed. Resource management agencies should at least be aware of the welfare implications of their recreation policies.

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PARKS BUT LITTLE RECREATION: A REPORT ON CROSS-COUNTRY SKIING FROM THE NATION'S SNOWIEST METROPOLITAN AREA

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This paper discusses the current status of cross-country skiing in the half-million populated area of Syracuse, New York, which, with its nine foot average seasonal snowfall, is the snowiest metropolitan area in the United States. Several themes will be pursued, including the role of ski touring centers and the promotion of taxpayer supported recreation programs by state and local agencies. Other topics include x-c ski trail layout and design. Guidelines for both public and private cross-country ski area operators in an urban area are proposed.

Central New York

Within forty-five minutes of driving from Syracuse's suburbs there are six ski touring centers and three major public areas, all of which have begun ski touring operation in the last decade (Fig. 1). Several generalizations

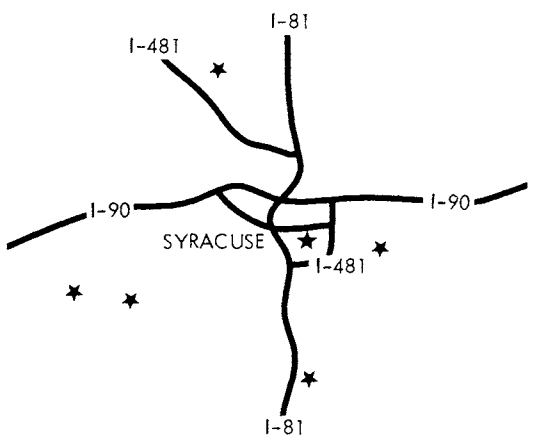

Figure 1 Syracuse Area Ski Touring Centers

can be made about these centers. The capital investment made by the operator in actual ski related activities is a paltry sum, sometimes less than $5,000. Operators either owned land prior to the establishment of the touring center or they leased or obtained easements after the creation of the ski touring center. The layout and design of most centers is quite substandard as judged against standardized criteria. Trail description and preparation are misrepresented. Ski instruction staffs are underqualified by professional standards. Perhaps the most regrettable aspect is the animosity of most ski touring center operators toward public officials charged with promoting recreation programs. The skiers suffer.

Some form of skiing has existed in central New York for much of this century. In the 1920's an enterprising golf course owner on the outskirts of Syracuse erected a tractor-driven ski tow against the side of a drumlin and downhill skiing was born -- a fact that escapes most New Englanders. This ski operation ran for fifty years and has now been supplanted by a ski touring center. A similar situation occurred at Green Lakes State Park east of Syracuse, where a ski tow was in operation for many years and was given after World War II to a nearby landowner who continues to operate a cramped low budget downhill and cross-country ski center on his land. Syracuse used to maintain a ski jump and participated on the fringe of the New England college ski carnivals. So cross-country skiing as we know it today has always had a toe hold in Central New York, albeit a tenuous one. Although it was possible to buy in Syracuse, Caldwell's The Cross-Country Ski Book in 1965, no ski store in Syracuse would sell or special order a pair of x-c skis for a customer. Now, ten years later cross-country skiing is booming. As the discount stores crank out $50 total ski packages, racers sample $100 poles. Whatever the capability of the skiers these people seek out places to ski. The variation in the cost of ski equipment is matched by the skier's technical skill. Unlike downhill skiing the proficiency of cross-country skiers is very low (Fig. 2). Local parks, stream-

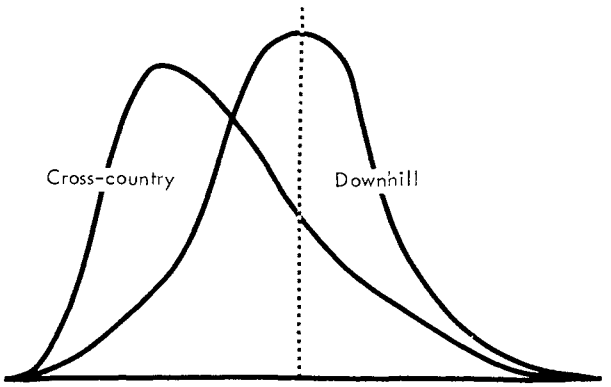

Figure 2 Skiing Profiency

banks and a recent innovation -- the ski touring center -- are ideal places to cross-country ski.[1]

Syracuse Area Ski Touring Centers

All the ski touring centers around Syracuse provide only secondary income for the operator. The areas are abandoned farms, golf courses and unproductive woodland. The owners are either retired or semi-retired or have primary incomes derived from some other pursuit such as selling camping gear, boats or running a licensed restaurant. Investment in the skiing facility itself can be limited to the purchase of track-setting equipment. One must remember that the total investment in track preparation equipment is often less than that sum often spent by an individual on snowmobiles, trailers, 4WD vehicle, and camper. A waxing-warming hut, and trail signs of some sort round out the list of equipment. Track construction is relatively crude but cheap; a four-person crew can clear one kilometer of track per day through open forest. Considerable expense is incurred, however, should bridges be built and hillsides be bulldozed level. Lighted loops are another considerable expense. The resort ski facility with accommodation is almost unknown in Central New York. Skiers are daily commuters from home or from work. Only a modest investment is required of a ski touring operator. Recouping that investment is nearly impossible if the only income derived is from trail fees at $2 per day or $25 per season. A principal source of income for ski touring centers is renting or selling skies and associated accessories, or by operating a snack bar. In one case the winter snack bar mushroomed into a licensed restaurant operating all year round. So for a small investment, often no greater than personal "recreation" motor vehicle expense, the ski touring center is in business. For most operators ski touring is just another way to supplement income during the slack winter season. This is not to say that the touring center operators are disinterested entrepreneurs -- some of them are passionate devotees of the sport and a couple of them are competent x-c skiers. It is, however, difficult to realize the investment in machinery from nickel and dime returns of trail fees. Consequently, more money is invested in fixed plant than in the trails themselves. Customers are well taken care of at the warming hut or lodge and are then turned loose on the trails.

Conflict Between Public And Private Ski Touring

During the past few years state and local Parks and Recreation Departments sought to broaden the recreation programming during the winter. The public response has been positive. Parking lots were jammed, skiers crowded the few available trails as recreation staffs struggled with taxpayer demands for more public skiing areas. Recreation planners operating in a haze of ignorance about cross-country skiing, made two responses. New trails were cut in parks to expand skiing areas. Without exception these trails were poorly designed. Terms such as Intermediate and Advanced had no meaning in designating trail difficulty. In addition to expanding the trail network, the public agencies decided to let bids for ski rental, the lowest bidder being granted the use of park buildings just as snack bars operate on park property during the summer. When several commercial ski touring centers heard of this plan they bitterly opposed it, denouncing it in the press and on the radio. Their position stated that the touring centers already operated below capacity and that public recreation departments promoting x-c skiing represented unfair competition. In support of their position several ski touring center operators solicited the support of "Ski Areas of New York," a downhill skiing public relations office. This organization, whose members represent large capital investments, assisted in squelching the rental proposals at public parks. (None of the touring centers were members of this organization.) More importantly, plans for grooming and tracksetting, necessities on crowded trails and a prerequisite for learning proper ski technique, were dropped at public areas. The effect of this policy is detrimental to skiing. Poor skiing conditions prevail at the parks, public trail construction is at a standstill and the established ski touring centers see no dramatic increase in revenues as other new touring centers open up, closer to the urban population who want to drive less and ski more. This is especially true with the lunch hour and late-afternoon skiers.

Ski Trail Design

Most ski trails are unimaginative and fail to realize the potential of the terrain. In locating trails too much attention is placed on supposed cognitions of scenic beauty, vegetation aesthetics and "wildness."[2] Rural bucolic ambience is no substitute for good skiing conditions. One successful downstate New York tour-

ing center is laid out over an abandoned industrial site which is an eyesore without snowcover as old cement kilns, ruined buildings and abandoned railroad bridges litter the place. Under a mantle of snow the place is transformed. The ski tracks are laid out by someone who knows how to obtain the maximum potential out of mediocre terrain. The tracks are groomed and maintained to the highest standards and the staff are enthusiastic about the operation. Full hotel fare is available as are cut-rate lodgings. In reviewing the success of this operation it is quite clear that skiers are willing to trade rural prettiness for good skiing conditions. Open fields harbor icy winds and windblown tracks. I am sure that many urban areas have old quarries, abandoned land and streambanks which, with some skill and imagination, could be converted into x-c ski areas.

Criticism has been leveled at design of ski touring centers in central New York. A good race track makes ideal touring tracks when skied more slowly. Guidance on these matters is available in the U.S. Nordic Handbook. Suggested criteria for type of trail, elevation, wind and exposure, are considered. Design criteria for terrain are discussed in full. Alignment, width and height of trails, and especially gradient are outlined. Every touring center would benefit by reading these guidelines. As pointed out in this booklet, it is terrain, rather than written statements, which often dictates what is to be done in trails design.[3] An experienced skier is a much more reliable source of information than is any forester or recreation director. There is no substitute for experience, but this quality is hard to find because there are fewer than a handful of skiers in central New York who have appropriate advanced skiing experience. New York State recently spent $35,000 on a feasibility report for a proposed $7 million dollar Nordic Ski Center. The Syracuse architectural firm who completed the report actually planned a x-c ski trail with a straight flat 1500 meter double pole portion on a trail. Clearly the blind are leading the blind in ski course design. How can this be rectified? A first step is to persuade the U.S. Ski Association and the National Ski Touring Owners Association, which already provide aid in signposting ski touring areas, to designate a number of people who could act as "delegates" to local ski areas. Enthusiasm of operators is in excess of their skiing ability and knowledge, so it is imperative for ski courses to be designed by skilled people. This job cannot be accomplished in one season. Prior to the actual cutting, the areas where snow lies longest should be mapped. By avoiding windblow areas, wet spots sunny places and pine forests, the expense of grooming and maintaining trails can be reduced.

Mapping The Trails

Once the trails have been constructed they should be mapped. There are several justifications for investing in good maps. Maps allow a cold and perhaps wet skier to find his way quickly and directly back to the refuge of a warming hut. A personal trail map with distances marked for each trail also provide a "truth in skiing" measure. (A jogger who covers 10 km in 45 minutes should think about skiing one hour for that same distance.[4]) Expensive trail markers at intersections, since they are attractive momentoes, frequently end up decorating college dormitory walls. A small giveaway offset printed map is a much cheaper means of directing skier traffic and an effective way of informing trespassing snowmobiles of their errant ways.[5]

A large map board would be situated at the waxing hut and individual maps should be available to all persons. Snow covered landscapes such as golf courses obscure the multiple features which help to orient skiers. Skiers can, for example, become disoriented on a 18-hole golf course. Sketch maps or a cartogram are not worth the paper they are printed on. Making any map is a time-consuming affair so it may as well be done right from the start. Most ski touring operators know nothing about the preparation of a trail map. The procedure follows. It is often possible to buy or borrow aerial photos of the property to be mapped. These photos, in conjunction with a topographic map are all that is often needed to make a suitable map. International ski courses as well as domestic ones have certain specifications for ski course maps and the construction is not beyond a student cartographer.[6]

A sketch map should be drawn at twice (1:5000) the final scale (1:10,000). USGS topographic sheets can be blown up to 1:5000 (480% enlargement) either by a local printing shop or by an epidiascope often called a Map-O-Graph. These contraptions are found in local college geography departments and the topographic sheet details are sketched in by hand. New trails can be quickly surveyed by an amatuer on foot. Measuring the entire set of trails is advisable. Two of Syracuse's ski touring centers are measured by a surveyor's wheel. Gradients and elevations are measured from a topographic sheet. Skiers want to know what is in front of them so the international standards on local relief should be observed. Hauteur de Difference (HD) is the difference between high and low points on a trail Montée Maximum (MM) represents the highest single climb on a trail, while Montée Totale (MT) is the sum of all climbs. Of course all measures are ISOmetric. After all the appropriate information is stuck on the map the draft map is reduced photographically (50%) to 1:10,000. Give away

copies can be handed out to the skier. The board map at the waxing hut should be of large size. The expense of making such a map need not be large. College students with a knowledge of surveying or cartography can make serviceable maps in exchange for a free season's trail pass or some other inducement. Well-mapped and signposted trails almost eliminates the need for these mobile signposts, the National Nordic Ski Patrol.

Ski Instruction

Perhaps the main role of ski touring centers is to teach skiing skills. For every hundred people who own cross-country skis in central New York, fewer than five can actually ski. Simple basic techniques such as diagonal stride, snowplow turn, stem turn are quite beyond the capabilities of these skiers. The most fraudulent claim ever made about x-c skiing was Rudi Matisich's statement, "if you can walk you can ski." Most beginners are unaware that proficiency in cross-country skiing takes longer to acquire than downhill skiing. How well have ski touring centers responded to this basic function? In the Syracuse area five certified EPSTI instructors teach skiing assisted by less than a dozen registered instructors.[7] It should be noted that all certified instructors received their certification prior to the structured examination placed in effect during the last two years. Although recertification is required, skiing skills of some certified instructors remain inadequate. Ski instruction can do much to enhance the enjoyment of the sport. Falling, wet clothing, and fatigue can be minimized by the acquisition of skiing skills.[8] With one exception, local ski instruction is not regarded as a vital part of the skiing center. Income from rental equipment and trail fees appear to be the target areas.

Summary

Parks and ski touring centers provide ideal places for people to recreate in the winter time. The degree of actual recreation which can be accomplished is limited by the condition of the snow on the trails. Recreation here means recreation, regeneration, or rebuilding in a physiological sense and not entertainment or leisure. Just as walkers and runners have difficulty moving in deep mud, cross-country skiers experience similar difficulties skiing in untracked snow, so much so in fact that it is almost impossible to learn to ski in untracked snow. Groomed, set tracks, then, are a prerequisite for trail skiing. To provide this service, ski touring centers have sprouted up in the Syracuse metropolitan area. Most offer promises instead of fulfillment. Tracksetting equipment often lies idle as skiers hack their way through ice crust. Most areas never groom more than five kilometers; consequently, trails become overcrowded and snow conditions deteriorate. Many people are unwilling to pay this user "fee" because of the poor conditions and opt for taxpayer supported parks which offer similar conditions. Public officials are willing to meet public demand for more trails and machine groomed tracks but are hampered by the political lobbying of privately operated touring centers in the Syracuse area. The only exception was the ski touring center closest to Syracuse. By not providing adequate facilities themselves and by preventing taxpayer supported public parks from meeting the demand, the quality of cross-country skiing remains poor.

Metropolitan ski touring centers do have a role in winter recreation. They are ideal locations for instruction to be offered, for equipment to be rented, as meeting places for clubs, and for the provision of superlative skiing conditions. Public parks and recreation officials also have an active role to play. They are mandated to provide quality winter recreation activities and places upon demand. Just as they mow grass for summer playing fields so are they obliged to groom and set ski tracks in the winter. This is part of normal maintenance and does not constitute a special service such as a snack bar or ski rental service, one which might require paying a special "user fee." If the recreational value of skiing is to be offered to the public it is essential that well maintained tracks and properly designed trail networks exist. Anything short of this is a waste of time and money. Suggestions have been made for designing cross-country ski courses.

What lessons might other urban areas learn from the Syracuse experience? The most successful venture in the Syracuse area, at least in terms of number of trail skiers, lessons given, and quality of teaching, is located right on the city boundary close to an interstate highway. It is so close to the city that office workers can ski during lunch time or at the conclusion of the work day. No commercial ski touring area will be a financial success unless rental equipment is used and ski lessons are offered during weekdays in addition to the weekend. School children, college students and suburban dwellers are immediate target groups. Not every urban dweller has a ski touring center in their neighborhood, so public parks, in various stages of development, are ideal places if suitable trails are constructed and maintained. The closer a ski area is to the population concentration the more successful it will be. Poor locations and poorly operated areas will be unable to survive in the commercial sphere.

A recent national survey indicated that cross-country skiing was the fastest growing form of outdoor recreation today. As public employees

serving at the discretion of the taxpayers it behooves us to offer them a chance to increase their fitness and enhance their enjoyment of the natural environment.

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EDUCATING THE PUBLIC FOR DISPERSED WINTER RECREATION

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The last decade has been one of mushrooming outdoor recreation and increasing environmental awareness. Unfortunately this new environmental awareness has not always been accompanied by sound environmental approaches to recreation. Frequently the pressure of too many people and environmentally degrading modes of recreation have ravaged our recreation areas.

When the number of recreationists was relatively small, damage done by careless users was often inconsequential and quickly rectified by the forces of nature. today, however, mistakes, carelessness, and errors in judgement have far greater impacts as the number of users increases at a frightening rate.

We believe that educational programs can effectively mitigate the environmental problems associated with recreation. Educating the user before he inflicts damage on the resource yields greater benefits to the environment than enforcement or repair-and-rehabilitation programs.

There are at least three broad types of educational programs in existence that could be modified to disseminate information concerning dispersed winter recreation. These are 1) public school programs; 2) experiential programs; 3) public agency media programs.

An example of the first type can be found in Flagstaff, Arizona School District's "Project Life". Although not specifically designed for winter recreation, sixth grade school children are exposed to environmental issues and wilderness ethics. The present setting for this unique school program is at a rustic lodge in a relatively remote area of the San Francisco Peaks in northern Arizona. The focus of Project Life is to promote environmental awareness through the understanding and appreciation of the ecology, history, geology, and perishability of our natural environment. With the expansion of such a program to other grade levels, there is a great potential for affecting the environmental priorities and values of today's youth.

Experiential programs dealing with dispersed winter recreation generally offer the most intensive form of education. Unfortunately the number of people joining such classes is small in relation to the total number of winter recreationists. This form of education is usually the most productive in making the participant aware of his or her role in the winter environment. This is probably due to the low instructor/participant ratio and the self-motivation displayed by the students (as evidenced by their interest in attending such a program). There are often dramatic and rewarding changes in the students' approach and attitude toward winter recreation.

In light of increasing program costs and the tenuous condition of the economy, the potential cliental for experiential programs may become more narrow and exclusive, thereby failing to reach that general population that needs and desires such educational opportunities.

Public agency media programs offer a broad exposure to the general public but are usually of a passive nature. The best known example is probably the Smokey the Bear campaign initiated by the Forest Service to warn of the dangers of wildfires.

The Southwest is beginning to receive media attention directed at winter backcountry safety, avalanche danger, snowshoeing, and cross-country skiing. Up to this point, however, little attention has been directed toward snowmobiles and their environmental impacts.

Application of all three program types would be extremely effective in raising the environmental awareness of winter recreationists. But winter recreational education now occurs in a haphazard manner and lacks consistency and effectiveness.

Some of the problems associated with dispersed winter recreation which educational programs should address include:

1) Human waste
2) Litter
3) Campfires
4) Vegetation and soil impacts
5) Conflicting uses
6) Access and transportation to the recreation area

The treatment of human waste deserves special attention in the winter environment. If possible latrines should be dug in soft ground. Freeze-thaw action will help decompose feces faster than if deposited in snow. Feces decompose slowly in snow and can contaminate surface water during spring melt. A site far from water, summer trails, or summer camping areas should be sought. A location with as little slope as possible should be used to minimize washing into surface water. Do not concentrate feces by having a group latrine. Snow should be kicked over urine stains to mimimize visual pollution. In areas of heavy winter use, an outhouse facility that is environmentally sound and properly maintained would be desirable.

Litter is especially difficult to monitor in the winter since items dropped in the snow are generally quickly covered. Special attention should be given to candy wrappers, food containers, and small personal items such as knives and utensils. Fuel cans from stoves and snowmobiles, along with oil cans and toilet paper are common problems.

Under winter conditions, it is very difficult to build a disguisable fireplace or to gather downed, dead wood. It can be done but our experience has shown that most people lack the initiative and/or knowledge to build an environmentally acceptable fire. Therefore, we recommend the use of backpacking stoves.

Vegetation destruction, soil compaction, and erosion by snowmobiles and other off-road vehicles has been fairly well documented (Wanek, 1971). Additionally, the disastrous impact by snowmobiles upon soil invertebrates, subnivean small mammals, and elk and deer is now known to be greater than originally believed (Baldwin and Stoddard, 1973). There is little evidence to indicate that cross-country skiing and snowshoeing cause significant disturbance to the subnivean environment. The direct and indirect impacts of motorized and non-motorized winter activities need to receive more publicity.

conflicting uses between winter recreationists are a major problem. The conflict between motorized and non-motorized users is by far the most common. The winter is an expecially quiet time in the backcountry and noise is particularly noticeable over a snow-covered landscape. One solution to this problem is to segreate these two different groups of users. Enforcement of such a policy is difficult at best and the "intrusion" of law enforecment personnel is not very conducive to a "wilderness experience".

The problems of access and transportation to the recreational sites are often overlooked. Parking areas are frequently unplowed during the winter causing some motorists to park on the highway and creating a dangerous traffic situation. Conversely, at some locations inadequate measures are taken to restrict motorized travel and vehicles may attempt to drive on snowy unsurfaced roads causing road damage and accelerating erosion.

Very little funding has been available for educational programs dealing with winter recreation. We believe that such programs are the most effective means of dealing with the problems referred to above. In addition to reduced environmental damage, other benefits of education include enhacement of personal enjoyment of the winter experience, skills training to augment safety, and interpretation of the natural environment. Together these benefits speak strongly for winter recreation education and the time has come to begin implementing programs.

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